RACIAL DIFFERENCES IN THE QUALITY OF HOME HEALTH CARE: WHAT ARE THE CONTRIBUTING FACTORS?

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ABSTRACT

Suzanne Brown Daly: Racial Differences in the Quality of Home Health Care: What are the Contributing Factors?
(under the direction of Barbara Mark)

Background: Racial disparities in the quality of care have been documented in numerous health care settings. However, there are no published studies in which quality of care has been compared between home healthcare agencies that serve a high and low percentage of African American patients (*High* and *Low AA HHAs*).

Objective: Guided by the theory of institutional racism, the overall purpose of this study was two-fold: to document whether racial differences in the quality of home health care exist and, if found, explore the relationship between market, community, organizational, nurse staffing characteristics and racial differences in quality of care.

Methods: This study employed a retrospective, non-experimental, descriptive design. There were five data sets: the Outcome and Assessment Information Set, the Provider of Services File, the Area Resource File, the Healthcare Cost Report Information System, and Home Health Compare. Four analyses were conducted: two descriptive analyses to compare patient characteristics between *High* and *Low AA HHAs* and to compare quality of care measures between *High* and *Low AA HHAs*; a multiple regression analysis to assess which characteristics (market, community, organizational, nurse staffing) influence differences in quality of care; and a logistic regression analysis to examine variation in quality among *High AA HHAs*.

Results: *High AA HHAs* were located in counties with a larger African American population and a higher number of unemployed persons and were more likely to be for-profit and have been

Medicare certified for fewer years compared to *Low AA HHAs*. *High AA HHAs* had lower quality of care scores for two of the six outcome measures. Community and organizational characteristics were more likely to be associated with observed racial differences than were market and nurse staffing characteristics. Organizational characteristics had more influence on variation in quality of care for *High AA HHAs* compared to market, community, and nurse staffing characteristics.

Conclusions: This study provided mixed evidence that differences in quality of home health care exist between *High* and *Low AA HHAs*. However, additional studies are needed to further our understanding of how policies and practices of social institutions can perpetuate racial differences in the quality of health care.

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CHAPTER 1: BACKGROUND AND SIGNIFICANCE

Problem Statement

In 2003, the Institute of Medicine (IOM) published a landmark report that extensively documented racial and ethnic disparities in the quality of health care. Disparities in the quality of health care, as measured by differences in treatment such as receipt of certain medications or surgery, were found in nearly every type of healthcare setting and across a number of illnesses (Smedley, Stith, & Nelson, 2003). Since the IOM report, racial disparities in quality of care have continued to be documented in a number of studies and in the yearly Agency for Healthcare Research and Quality (AHRQ) National Quality and Disparities Report (previously named the National Healthcare Disparities Report) (Agency for Healthcare Research and Quality [AHRQ], 2015; Klonoff, 2009). Racial disparities pose a significant moral problem for healthcare providers, policy makers, and patients: Unequal quality of care often leads to worse outcomes for racial minorities, including premature death, and has been identified as a potential contributor to the persistent gaps in health status between minorities and non-minorities (AHRQ, 2015; Smedley et al., 2003).

As is the case in other healthcare settings, racial disparities in the quality of home health care have also been documented, though only in three recent studies (Brega, Goodrich, Powell, & Grigsby, 2005; Peng, Navaie-Waliser, & Feldman, 2003; Towne, Probst, Mitchell, & Chen, 2015). None of the studies examined the potential causes of disparities in the quality of home health care and the underlying mechanisms remain unclear. As a result, the development and implementation of policies and interventions aimed at reducing disparities in home health care

has been slow. This leaves minority patients, and in particular African American patients, vulnerable to poor-quality home health care. Therefore, identifying the factors that contribute to racial differences in the quality of home health care could lead to the development and implementation of policies and interventions that are effective at reducing racial differences in quality of care.

The purpose of this chapter is to provide background information on disparities in the quality of health care, to describe home health care, to state the purpose and aims of this study, and to explain the significance of this study. Major topics discussed include the following: evidence of disparities in quality of care, the recent shift in focus of disparities research, factors that likely contribute to disparities in home health care, a description of home health care, and why the study focuses specifically on African American patients rather than all minorities.

Background

Racial disparities in health, access to health care, and quality of health care in the United States have been extensively documented for decades (Benz, Espinosa, Welsh, & Fontes, 2011; Hasnain-Wynia & Beal, 2012; Klonoff, 2009; Koh, Graham, & Glied, 2011; Smedley et al., 2003). However, it was the Report of the Secretary's Task Force on Black and Minority Health (referred to as the "Heckler Report") published in 1985 by the U.S. Department of Health and Human Services (DHHS) that first brought the issue of racial disparities in health and health care to national prominence (Benz et al., 2011; Hasnain-Wynia & Beal, 2012). This report was followed by reports from the American Medical Association (AMA), IOM, and AHRQ, all documenting the pervasiveness and persistence of disparities throughout the healthcare system. The reports from the IOM and AHRQ led to increased attention by researchers on disparities in care, but recent research has indicated the public is largely unaware that disparities exist (Benz et

al., 2011). The DHHS released the "2011 Action Plan to Reduce Racial and Ethnic Health Disparities," a plan that aims to reduce disparities by taking advantage of the Affordable Care Act of 2010, transforming the healthcare system, and increasing public awareness of disparities (Koh et al., 2011).

Report of the Secretary's Task Force on Black and Minority Health

The Report of the Secretary's Task Force on Black and Minority Health (hereafter referred to as the "Heckler Report") described the findings and recommendations of an 18-member task force appointed by Secretary of Health Margaret Heckler to directly assess the persistent health status disparities found between Whites and minority Americans (Heckler, 1985). The task force examined the national morbidity and mortality data for minorities and non-minorities as well as health status indicators (e.g., physician visits and self-assessed health status) for both groups (Heckler, 1985). The most significant contributions of the report were its extensive documentation of disparities in health status between Whites and minorities—it pushed minority health issues onto the national agenda and it directly led to the creation of the Office of Minority Health (Gamble & Stone, 2006; Heckler, 1985).

American Medical Association Report

Following the Heckler report, in 1990 the AMA identified what it termed "unjustifiable" racial disparities in healthcare access and treatment between African American and White patients (Council on Ethical and Judicial Affairs, 1990; Hasnain-Wynia & Beal, 2012). Similar to the Heckler Report, the AMA report identified disparities in access and treatment in nearly every sector of health care, acknowledged that the underlying causes were likely to be many, and proposed several recommendations such as improving access to care as solutions to the problem of disparities (Council on Ethical and Judicial Affairs, 1990).

Institute of Medicine 2003 Report

In 1999 the U.S. Congress requested that the IOM specifically examine the relationship between race and ethnicity and quality of health care, independent of patients' insurance status, level of education, socioeconomic status, and any other factors known to affect access to care (Smedley et al., 2003). The result was the 2003 report "Unequal Treatment," which has been widely cited throughout disparities literature. In addition to documenting disparities in the quality of care, the report provided researchers with a standard definition of disparities that has become broadly used by disparities researchers. The IOM defined *disparities in quality of care* as "racial or ethnic differences in the quality of healthcare that are not due to access-related factors or clinical needs, preferences, and appropriateness of intervention" (Smedley et al., 2003, pp. 3–4).

The IOM report also provided numerous recommendations to reduce and eliminate disparities such as: increasing public awareness of racial and ethnic disparities; increasing the proportion of racial and ethnic minority health professionals; using evidence-based guidelines to provide consistently high quality care to patients; include cultural competency training for health professionals; collect data on patients' race, ethnicity, socioeconomic status, and primary language and stratify quality reports using patient demographic data; and continue funding of research that identifies the causes of racial disparities in care (Smedley et al., 2003).

AHRQ National Healthcare Quality and Disparities Report

The AHRQ was reauthorized by the U.S. Congress with The Healthcare Research and Quality Act of 1999. Included in this reauthorization was a mandate that AHRQ produce a yearly report on healthcare quality in the United States (AHRQ, 2005). In 2003 the AHRQ published its first National Healthcare Disparities Report (NHDR, renamed the National Healthcare Quality and Disparities Report in 2015) in an effort to measure differences in quality of care, provide a

comprehensive summary of disparities in the United States, and present a "national roadmap" for reducing disparities in healthcare quality and access to care (AHRQ, 2003). The AHRQ's operational definition of *disparities in quality of care* for their NHDR is "the differences or gaps in care experienced by one population compared with another population" (AHRQ, 2010, p. 1). To meet the definition of a disparity, AHRQ requires that the "differences" between populations be statistically significant and differ from the reference group by at least 10% (Hebert, Sisk, & Howell, 2008).

The first NHDR indicated that racial and ethnic minorities and people of lower socioeconomic status experienced significantly poorer quality of care compared to the White majority and those of higher socioeconomic status (AHRQ, 2003). Similar to the 2003 IOM report, disparities were identified across the healthcare system for all types of conditions and in every healthcare setting (AHRQ, 2003). In addition, the authors of the 2003 NHDR found that the reasons for disparities in quality and access were not well understood (AHRQ, 2003). Since the first NHDR was published, there have been 11 additional yearly reports. With each subsequent report the authors have noted that despite efforts to reduce disparities, they persist, in some cases worsening. The most recent National Healthcare Quality and Disparities Report indicates that although quality of care has improved, racial disparities are common across the healthcare system and a number are either staying the same or worsening (AHRQ, 2015).

Department of Health and Human Services 2011 Action Plan

Several years ago, the DHHS unveiled a new plan—The 2011 HHS Action Plan to Reduce Racial and Ethnic Health Disparities. Included in this plan is a goal to transform health care by reducing disparities in the quality of care through the Affordable Care Act of 2010 (Koh et al., 2011). Under the Affordable Care Act, all federally supported health programs are required to collect race and ethnicity data and to stratify quality reports, allowing providers and

administrators to identify disparities. Medicaid coverage has significantly expanded in many states, covering individuals up to 133% of the federal poverty level, and there was parity in Medicaid and Medicare payment rates for primary care providers in 2013 and 2014 (funded by the federal government), though many states (at least 24) do not have plans to continue to fund these increased rates (Burwell, 2014; Hasnain-Wynia & Beal, 2012; Kaiser Family Foundation [KFF], 2014; Koh et al., 2011). The National Center on Minority Health and Health Disparities has become an Institute, leading to a significant expansion of research on disparities and solutions (Hasnain-Wynia & Beal, 2012). In addition, $11 billion in funds (over 5 years; the first of the awards was made in 2014) will be spent on improving community health centers, which tend to serve a significant number of low income minority patients (Bureau of Primary Health Care, 2016; Koh et al., 2011). Taken together, these initiatives could lead to greater insurance coverage for minorities and improved access to care and ultimately equitable care for all Americans.

Disparities in Quality of Care Between African Americans and Whites

Numerous studies across the majority of healthcare settings and types of illnesses have indicated that there are disparities between the quality of care provided to African American and White patients (AHRQ, 2015; Hasnain-Wynia et al., 2010; Howell, Egorova, Balbierz, Zeitlin, & Hebert, 2016; Keating, Kouri, He, Weeks, & Winer, 2009; Klonoff, 2009; Regenbogen, Gawande, Lipsitz, Greenberg, & Jha, 2009; Smedley et al., 2003). Disparities in quality of care are often measured by quality indicators that measure outcomes of care or processes of care. For example, outcome of care quality indicators might be mortality rates for specific conditions such as congestive heart failure or pneumonia (Gaskin et al., 2008). A process of care quality indicator might be whether a patient received a beta-blocker after an acute myocardial infarction or received smoking cessation counseling after a diagnosis of pneumonia (conditional on a history

of smoking) (Keating et al., 2009; Klonoff, 2009; Regenbogen et al., 2009). Once access and disease severity are controlled for, researchers have found that, compared to White patients, African American patients are more likely to receive a) care that is considered less effective, b) care that is of poorer quality based on established markers of high-quality care, and c) higher rates of less desirable procedures such as amputation (Klonoff, 2009; Konetzka & Werner, 2009; Regenbogen et al., 2009; Smedley et al., 2003).

Researchers continue to document disparities in common procedures that have been identified as indicators of quality of care such as breast cancer screening, colorectal cancer screening, eye examinations for patients with diabetes, and the use of beta-blockers after an acute myocardial infarction (AHRQ, 2015; Klonoff, 2009). Compared to White women with breast cancer, African American women with breast cancer are less likely to receive definitive primary therapy (defined as either a mastectomy or breast-conserving surgery with radiation) for breast cancer (Keating et al., 2009). Racial disparities in care have also been found in the treatment of pain and in rates of surgery (Keating et al., 2009; Regenbogen et al., 2009). African American patients are less likely than Whites to receive opioids for pain control in emergency rooms (Joynt et al., 2013; Pletcher, Kertesz, Kohn, & Gonzales, 2008). In terms of rates of surgery, compared to White patients and when insurance status and other factors are controlled, African American patients are less likely to be considered for kidney and liver transplantation, are less likely to be on the transplant waiting lists for a liver or kidney, and are much less likely to actually undergo transplantation (Reid, Resnick, Chang, Buerstatte, & Weissman, 2004; Smedley et al., 2003; Stolzmann, et al., 2007). African American patients, compared to White patients, are also more likely to receive an open appendectomy instead of the less invasive laparoscopic appendectomy (Pieracci, Eachempati, Christos, Barie, & Mushlin, 2007). In two studies that examined

revascularization for White and African American patients after an acute myocardial infarction, African American patients were transferred more slowly to hospitals with revascularization, were less likely to receive revascularization once transferred, and had higher long-term mortality rates (Cooke, Nallamothu, Kahn, Birkmeyer, & Iwashyna, 2011; Popescu, Vaughan-Sarrazin, & Rosenthal, 2007). In a 2009 study, Regenbogen et al. found that African American patients with lower extremity arterial disease were much more likely to undergo limb amputation compared to White patients. African American patients are more likely to be hospitalized for preventable conditions—problems that might not have occurred had they received appropriate preventive care (Smedley et al., 2003). Finally, there has been an increased focus on 30-day readmission following a 2007 Medicare Payment and Advisory Commission (MedPAC) report to the U.S. Congress that indicated 75% of Medicare readmissions were avoidable and that these readmissions were costing Medicare $15 billion per year (McHugh, Carthon, & Kang, 2011). As an example, elderly African American patients have been found to have higher rates of readmission for acute myocardial infarction, congestive heart failure, and pneumonia compared to elderly Whites (Joynt, Orav, & Jha, 2011).

In nursing homes, racial disparities in both process of care and outcomes have been found in a number of different studies (Konetzka & Werner, 2009). In several studies, when compared to White nursing home residents, African American nursing home residents were found to be less likely to receive anti-diabetic medication (if diabetic), less likely to receive anticoagulant medication (if at risk for stroke), have higher rates of pressure sores, and were less likely to be diagnosed and treated for depression (Konetzka & Werner, 2009; Li, Yin, Cai, Temkin-Greener, & Mukamel, 2011). In terms of home health care, compared to White home healthcare patients with the same functional status on admissions, African American home healthcare patients

experienced significantly worse functional outcomes such as improvement in grooming, bathing, and walking (Brega et al., 2005).

Racial disparities in health and health care are costly in terms of lives lost and the burden on patients, families, and the healthcare system (LaVeist, Gaskin, & Richard, 2009). There are recent estimates that the elimination of health disparities would have reduced direct medical care expenditures from 2003 to 2006 by $229.4 billion (LaVeist et al. 2009). Disparities have been estimated to cost $1.2 trillion in lost wages and productivity between 2003 and 2006 (Bahls, 2011; LaVeist et al., 2009). The cost in 2009 to African American and Hispanic patients of providing care for preventable conditions such as diabetes, high blood pressure, and stroke was approximately $24 billion (Bahls, 2011). In addition, when a group of individuals is less healthy, the result is an increase in costs for health care for not only those individuals but also the entire country (Smedley et al., 2003). The burden of health disparities then is on not only the individuals who experience inequitable care but also the nation as a whole. Thus, reducing disparities and improving quality of care for one segment of the population could directly and indirectly benefit the entire country (Bahls, 2011; Smedley et al., 2003).

Shift in Focus of Disparities Research

The focus of disparities research, until recently, has largely been on within-facility disparities and the patient and provider contribution to disparities (Gaskin, Dinwiddie, Chan, & McCleary, 2012; Griffith et al., 2007). Therefore, most initiatives focused on enhancing patient-provider communication, providing cross-cultural education to healthcare providers so that they have a greater awareness of cultural and social factors that might influence a patient's care, and educating patients so that they play a more active role in decision-making and managing their health care (Griffith et al., 2007; Smedley et al., 2003). However, these individual-level approaches have not been successful at eliminating disparities (Gaskin et al., 2012; Griffith et al.,

2007). An alternative explanation is that disparities in care are due, in part, to differences between the organizations from which African Americans and Whites receive care (Brooks-Carthon, Kutney-Lee, Sloane, Cimiotti, & Aiken, 2011; Creanga, Bateman, Mhyre, Kuklina, Shilkrut, & Callaghan, 2014; Hasnain-Wynia et al., 2007; Howell et al., 2016). Thus, recent research has begun to identify and characterize organizations that provide care for African American patients in terms of both structural features (e.g., type of ownership, number of beds, nurse:patient ratio) and the communities in which they are located (Brooks-Carthon et al., 2011; Hasnain-Wynia et al., 2007).

In the acute care and long-term care (i.e., nursing home care and home healthcare) settings, one of the concerns with studies on racial disparities in quality of care is that many studies did not control for site of care and thus determining whether the disparities are the result of within-facility or between-facility differences is unclear (Gaskin et al., 2008; Konetzka & Werner, 2009). However, in studies of both acute and long-term care, where site of care was controlled, disparities in quality were significantly reduced or eliminated, an indication that disparities in quality are more likely the result of between-facility variation as opposed to within-facility variation (Gaskin et al., 2008; Konetzka & Werner, 2009). Such a distinction is important because the interventions to address the disparities will be different depending on whether they are the result of within- or between-facility differences. For example, if White and African American patients receive differential treatment within a given hospital or nursing home, it is possible that such differential treatment is the result of discrimination by providers and therefore the interventions to reduce disparities should be targeted at providers (Gaskin et al., 2008). However, if the disparities are the result of between-facility differences, this is more likely an indication that African American patients are receiving care from organizations that are

providing lower overall quality of care and that everyone in the facility is receiving poor quality of care, not just one group (Konetzka & Werner, 2009). In fact, a recent study has shown that hospitals that serve high percentages of African American patients have poorer outcomes for *all* their patients, not just the African American patients (Lopez & Jha, 2013). In this case, interventions would be aimed at lower-performing facilities and helping these facilities improve overall quality of care (Lopez & Jha, 2013).

Researchers have found that African American patients receive health care in different settings than White patients (Gaskin et al., 2012; Hasnain-Wynia et al., 2010; Jha, Orav, Li, & Epstein, 2007). This is at least partly due to patients' often seeking care within their own communities, which tend to be racially segregated (Gaskin et al., 2012; Konetzka & Werner, 2009; LaVeist, Pollack, Thorpe, Fesahazion, & Gaskin, 2011). Acute and outpatient care settings that disproportionately serve African American patients have lower quality of care and have physicians who are less well trained and less often board certified (Bach, Pham, Schrag, Tate, & Hargraves, 2004; Creanga et al., 2014; Howell et al., 2016; Lucas, Stukel, Morris, Siewers, & Birkmeyer, 2006; Jha et al., 2007). Hospitals that serve a large percentage of African American patients also have reports of lower levels of patient satisfaction and lower levels of nurse satisfaction (Brooks-Carthon et al., 2011). Inpatient care for African American patients is concentrated in a small percentage of hospitals with poorer quality of care (Hasnain-Wynia et al., 2007). Twenty-five percent of hospitals provide care for almost 90% of elderly African American patients. Care for acute myocardial infarction and pneumonia is worse in these hospitals when compared to hospitals that care for a smaller percentage of elderly African American patients (Jha et al., 2007). Hasnain-Wynia et al. (2010) recently examined Hospital Quality Alliance measures in 4,450 non-federal hospitals in the United States. They found racial

disparities in nearly 40% of the quality measures (37 out of 95 measures) and the majority of these disparities were explained by site of care, suggesting that a likely cause of racial disparities is that minority patients receive care in lower-performing hospitals. In addition, mortality rates and surgical mortality rates are higher for elderly patients admitted with acute myocardial infarction in hospitals that care for a high percentage of African American patients (Skinner, Chandra, Staiger, Lee, & McClellan, 2005; Lucas et al., 2006). Finally, in terms of obstetric care, hospitals that serve a high percentage of minority patients have higher rates of severe maternal morbidity and perform more poorly on delivery-related indicators of care compared to hospitals that serve a low percentage of minority patients (Creanga et al., 2014; Howell et al., 2016).

In the outpatient setting, Varkey et al. (2009) found that clinics with a higher proportion of minority patients (greater than 30% minority) were more likely to have less access to medical supplies and referrals to specialists and also fewer examination rooms per physician. Patients seen at these clinics were also more likely to be covered by Medicaid, report depression, experience problems with substance abuse, and have lower health literacy and more complex medical problems. Physicians at clinics with a higher proportion of minority patients were also less likely to have high rates of job satisfaction and more likely to report working in a chaotic working environment (Varkey et al., 2009). In a separate study, Reschovsky and O'Malley (2008) found that high minority outpatient practices (greater than 70% minority patients) were highly dependent on Medicaid and have lower private insurance reimbursements, leading to constrained resources for physicians.

There has also been research in long-term care to suggest that there is racial segregation in nursing homes in the United States. Nursing home care for African American patients is highly concentrated in homes that are located in the poorest counties and have fewer nurses,

more health-related deficiencies, and poorer quality of care (Mor, Zinn, Angelelli, Teno, & Miller, 2004; Smith, Feng, Fennell, Zinn, & Mor, 2007). Compared with nursing homes that serve a low percentage of African American patients (*Low AA NHs*), those that serve a high percentage of African American patients (*High AA NHs)* provide poorer quality of care, have fewer resources to improve quality, and have different structural and contextual characteristics such as profit status, size, and location (Miller, Papandonatos, Fennell, & Mor, 2006; Mor et al., 2004; Smith et al., 2007). *High AA NHs* are more likely to use chemical and physical restraints, have more inspection deficiencies that cause actual harm to patients or place them in immediate danger, have a higher incidence of pressure ulcers, and are more likely to be terminated from Medicare/Medicaid participation (Li et al., 2011; Miller et al., 2006; Mor et al., 2004; Smith et al., 2007). In addition, residents of *High AA NHs* are more likely to have lower quality of life compared to residents of *Low AA NHs* (Shippee, Henning-Smith, Rhee, Held, & Kane, 2016). Whether quality of care is lower in home healthcare agencies that serve a high proportion of African American patients (*High AA HHAs)* than it is in those that serve a low proportion of African American patients (*Low AA HHAs)* is an unexplored area of research.

Factors that Contribute to Disparities in Care

Unfortunately, no studies have examined disparities in care between *High* and *Low AA HHAs* or disparities between home healthcare agencies, regardless of the racial makeup of the patient population. There are however several studies that have examined predictors of quality in home health care. In addition, there has been a significant amount of research on nursing homes, including numerous studies that have examined disparities between *High AA nursing homes* and *Low AA nursing homes* and disparities between nursing homes, regardless of the racial makeup of the patient population. There have also been many studies that have investigated predictors of quality in nursing homes. Thus, this study drew on research from three separate areas—

predictors of quality in home healthcare agencies; predictors of quality in nursing homes; and disparities between nursing homes—to guide conceptual model development and variable identification.

In long-term care, quality of care is influenced by market, community, organizational, and nurse staffing characteristics (Brega, Jordan, & Schlenker, 2003; Castle & Engberg, 2007). Several of these factors have also been investigated as possible causes of disparities between *High AA* and *Low AA nursing homes* (Fennell, Miller, & Mor, 2000; Miller et al., 2006; Mor et al., 2004). Characteristics from each of these groups (market, community, organizational, and nurse staffing) were examined in this study to determine if they influenced differences in quality of care–either individually or together—between *High AA* and *Low AA HHAs*. The research on these predictors and their application to racial disparities in home health care will be fully discussed in Chapter 3.

Variation in Quality in *High AA HHAs*

As with other healthcare organizations, those that are *High AA* likely vary in the quality of care they provide, with some providing exceptional quality and others providing poor quality. Unfortunately, there are no studies in which variation in quality of care among *High AA* organizations has been examined. There is one study in which the best practices of high-quality minority-serving hospitals were examined (Gaskin & LaVeist, 2009). Gaskin and LaVeist (2009) examined eight urban hospitals that served a high volume of minority and low-income patients. Hospital quality of care was determined by computing a hospital-level composite quality score consisting of AHRQ inpatient quality indicators and patient safety indicators. Interviews were conducted with the CEO, CFO, medical director, quality improvement officer, and head of nursing at each hospital (Gaskin & LaVeist, 2009). The authors found that these hospitals had: a committed, stable leadership that did not tolerate disparities; top management that was sensitive

to the needs of their patient population and was able to effectively communicate their patients' needs throughout their organization; and the ability to use limited resources effectively (Gaskin & LaVeist, 2009). In addition, they found that lower-performing minority-serving hospitals were under-resourced both in terms of financial capabilities and actual human resources (Gaskin & LaVeist, 2009).

This dissertation study goes beyond the Gaskin and LaVeist (2009) study by focusing on *variation* in quality of care among *High AA HHAs* and examining how factors such as market, community, organizational, and nurse staffing characteristics might vary between *high* and *low quality High AA HHAs*. Understanding variation in quality of care in *High AA HHAs* is important for several reasons. There might be specific ways that high-quality *High AA HHAs* manage resource constraints that have been found in *High AA* organizations. Low-quality *High AA HHAs* might be able to adopt some of these practices to better use limited resources. There also might be specific nurse staffing practices that high-quality *High AA HHAs* use to provide care that is targeted for their specific patient populations, and these might be practices that low-quality *High AA HHAs* could adopt to improve the care they provide. In addition, although high-quality *High AA HHAs* might have a similar payer mix compared to low-quality *High AA HHAs,* there could be differences in certain organizational characteristics such as higher revenues or profit margin that might be an indication that high-quality *High AA HHAs* manage resource constraints more effectively compared to low-quality *High AA HHAs.* Low-quality *High AA HHAs* might be able to adopt some of these practices to better use limited resources. Finally, it is possible that high-quality *High AA HHAs* do not have the same resource constraints that plague low-quality *High AA HHAs.* The answer to improving quality in low-quality *High AA HHAs* might be to provide these agencies with more resources instead of asking them to do more with less.

High AA HHAs likely face unique challenges to providing high-quality care. Identifying and understanding factors that help or hinder the provision of high-quality care in these organizations can help administrators, researchers, and policy makers design interventions and policies that are likely to be the most effective at helping low-quality *High AA HHAs* provide high-quality care to their patients. Although it will require further study to identify the specific practices used by high-quality *High AA HHAs*, this study could possibly identify a starting point for further investigation of these agencies.

Home Health Care

Definition of Home Health Care

Although the terms *home care* and *home health care* are often used interchangeably they do not mean the same thing. The term *home care* simply refers to any type of care that is provided in the home (Pratt, 2010). This would include any unpaid services from family or friends providing assistance, social services such as Meals on Wheels, and other services typically provided by home care aides such as assistance with bathing and preparing meals (Pratt, 2010). There are estimates that the majority of elderly and disabled residents who need or receive long-term care of some type have only unpaid help and payment for long-term care services constitutes a significant portion of personal spending on health care (Harris-Kojetin, Sengupta, Park-Lee, & Valverde, 2013; Kaye, Harrington, & LaPlante, 2010). *Home health care* can be distinguished from *home care* in that home healthcare services are provided by healthcare professionals to patients in their homes and these services are often paid for by either Medicare (for older adults), Medicaid, or other types of insurance. These services can include skilled nursing care by registered nurses, licensed practical nurses, or nursing assistants; case work by medical social workers; nutrition counseling by licensed dieticians; or services such as occupational, speech, or physical therapy (Harris-Kojetin et al., 2013; Pratt, 2010; National

Association for Home Care and Hospice [NAHC], 2010). These services are typically paid for by Medicare or Medicaid with a small percentage of services paid for by private insurance (Kaye et al., 2010; NAHC, 2010).

Home Healthcare Recipients

There are estimates that in 2013 3.5 million Medicare recipients received home healthcare services from approximately 12,613 Medicare-certified home healthcare agencies (Medicare Payment Advisory Commission [MedPAC], 2015). The majority of home healthcare users were aged 65 (less than 18% were under 65) and were women (nearly 63%) (Harris-Kojetin et al., 2013). In terms of race, the majority (approximately 78%) of home healthcare patients were White or "other" ("other" includes Asian, Native Hawaiian or other Pacific Islander, American Indian, Alaskan Native, and multiple races) while 14% were African American and slightly over 8% were Hispanic (Harris-Kojetin et al., 2013). In comparison, in the 2010 Census, older individuals (aged 65 and over) made up only 13% of the overall U.S. population, women constituted half of the population, and African Americans accounted for 13% of the total population (U.S. Census Bureau, 2013). Finally, most home healthcare patients live in a Metropolitan Statistical Area, which is a geographic entity defined by the U.S. Office of Management and Budget containing a core urban area with a population of at least 50,000 or more (U.S. Census Bureau, 2010a).

Home healthcare patients tend to be less disabled than nursing home residents, though use of home healthcare services by younger, disabled individuals is increasing as states seek to contain costs associated with providing care to these individuals (Ng, Harrington, & Kitchener, 2010; Pratt, 2010). Home healthcare is often provided to patients who have been discharged from a hospital and are in need of post–acute care rehabilitation services. The average number of "episodes of care" (an "episode of care" is defined as the time from admission to discharge) per

user was 1.9 in 2013, up from an average of 1.6 in 2002 (MedPAC, 2015), indicating longer lengths of stay over the past decade. The most common diagnoses of home healthcare patients in 2007 were hypertension, heart disease, and diabetes (Caffrey, Sengupta, Moss, Harris-Kojetin, & Valverde, 2011; Jones, Harris-Kojetin, & Valverde, 2012; NAHC, 2010).

Though there is general descriptive information available about home healthcare patients, nothing is known about the potential differences between home healthcare patients served by *High AA HHAs* and those served by *Low AA HHAs.* However, there is research that suggests that patients served by hospitals that are lower-performing and treat a high percentage of African American patients differ significantly from those patients that are served by higher-performing hospitals that care for a lower percentage of African American patients (Popescu, Werner, Vaughan-Sarrazin, & Cram, 2009). In 2009, Popescu and colleagues examined organizational and patient characteristics of high- and low-performing hospitals that reported performance on acute myocardial infarction quality measures. They found that Medicare beneficiaries with an acute myocardial infarction who were treated by lower-performing hospitals differed significantly from those who were treated by intermediate- and higher-performing hospitals (Popescu et al., 2009). For example, patients treated by lower-performing hospitals were more likely to be female, reside in lower-income communities, and had higher rates of comorbidity (Popescu et al., 2009). Such information is important for home healthcare agencies to know because they might need more or different staff and might need to provide different support to their patients. This study provides some initial insight into whether or not there are important differences between the patients served by *High* and *Low AA HHAs.*

Payers of Home Health Care

Home healthcare services are typically paid for by Medicare or Medicaid. Medicare is the largest payer of home healthcare services, with Medicare spending accounting for 41% of home

healthcare expenditures in 2014 (Centers for Medicare and Medicaid Services [CMS], 2015c). In fiscal year (FY) 2014, Medicare spending on home health care accounted for approximately 3% of total Medicare expenditures (Cubanski et al., 2015). However, Medicaid is projected to become the largest payer of home healthcare services over the next decade as a result of consumer preferences for in-home care instead of institutional care and as states increase spending on home healthcare for disabled individuals and decrease spending on institutional care (NAHC, 2010; Ng et al., 2010; Pratt, 2010). Medicaid spending on home healthcare services was $29.6 billion in FY 2014, an increase of over $16 billion from FY 2004.

Home Healthcare Agencies

In 2013 there were 12,613 home healthcare agencies (MedPAC, 2015). The majority of all home healthcare agencies is for-profit and is not part of a healthcare system (Harris-Kojetin et al., 2013; MedPAC, 2015). In addition, nearly all were certified by Medicare, Medicaid, or both. Nearly half of all home healthcare agencies were located in the South and most agencies (nearly 84%) were located in a metropolitan statistical area (Harris-Kojetin et al., 2013). The majority of patients referred to home healthcare agencies were referred by either a hospital or physician's office. Approximately 40% of all Medicare certified home healthcare agencies were small, completing between 1 and 100 "episodes of care" per year (Harris-Kojetin et al., 2013). Finally, registered nurses made up the majority (54%) of nursing employees for home healthcare agencies and the majority of home healthcare agencies provided social work services and at least one type of therapeutic services (e.g., physical therapy) (Harris-Kojetin et al., 2013).

Study Purpose and Aims

The overall purpose of this study is two-fold: to document whether racial differences in the quality of home healthcare exist and, should they be found, explore the relationship between specific factors (market, community, organizational, nurse staffing) and racial differences in an

effort to provide information needed to affect policies to decrease racial differences in quality of home health care.

Therefore, the specific aims of the study were to:

1. Compare patient characteristics in *High AA HHAs* to those in *Low AA HHAs* using patient demographic variables available as part of the Center for Medicare and Medicaid's (CMS) Outcome and Assessment Information Set (OASIS) data.
2. Compare the quality of care in *High AA HHAs* to *Low AA HHAs* using quality measures reported on the CMS's Home Health Compare Web site.
3. Assess whether and which market, community, organizational, and nurse staffing characteristics individually and together account for differences in quality of care provided to patients of *High* and *Low AA HHAs*.
4. Examine the variation in quality among *High AA HHAs* and identify the factors (market, community, organizational, nurse staffing) that differentiate high- and low-quality *High AA HHAs*.

Differences or Disparities

Researchers frequently use the term "disparities" to denote differences in access, health status, or quality of care between White and minority patients (Hebert et al., 2008). However, as described previously in this chapter, different organizations (e.g., AHRQ, IOM) have varying definitions for the term "disparities." This lack of a standardized definition makes identifying and reporting disparities in quality of care (or access or health) difficult (Hebert et al., 2008). Given the lack of standardization for the term "disparities", we have chosen to use the term "differences" rather than "disparities" to indicate any identified differences in characteristics (patient, market, community, organizational, nurse staffing) or quality of care between *High* and

Low AA HHAs. We will use the term "differences" to discuss results from this study, but will use the term "disparities" when reporting other research that uses the term or when discussing the general state of disparities knowledge and research.

Focus on African American Patients

This study focused on quality of care for African American home healthcare patients rather than *all* racial minority patients. Studies have shown that White, African American, and Hispanic patients receive care from hospitals and other healthcare organizations that are structurally and organizationally different (Jha et al., 2007; Jha, Orav, Zheng, & Epstein, 2008). For example, the hospitals that care for 45% of African American patients are typically large (greater than 400 beds), located in the South, private not-for-profit, urban, have a medical and surgical intensive care unit, and serve a high percentage of Medicaid patients (Jha et al., 2007). In comparison, hospitals that care for over half of all Hispanic patients are more likely to be medium-sized (100–400 beds), located in the West, for-profit, serve a high percentage of Medicaid patients, and not have a surgical or medical intensive care unit (Jha et al., 2008). Less is known about patients from other racial and ethnic minority groups because of the limited amount of data available. Given these findings, there may be factors and mechanisms specific to the organizations that care for different groups of racial and ethnic minority patients that affect quality of care for these groups and need to be addressed by the organizations that provide their health care (Popescu et al., 2009).

In addition, the number of home healthcare patients from other racial and ethnic groups (e.g., Hispanic, Asian, Native American) is relatively small (all together less than 5%) and therefore making statements of statistical significance regarding identified differences between each of these racial and ethnic groups and the majority White group would be difficult (Harris-Kojetin et al., 2013). Therefore, by focusing on one specific group, this study presented a more

detailed understanding of the home healthcare organizations that care specifically for a higher percentage of African American patients. Such insight could lead to the identification of the factors that might be contributing to racial differences in the quality of care for African American home healthcare patients.

Study Significance

Focusing on racial differences in the quality of home health care is important for three reasons: there is limited evidence regarding the existence of racial disparities in home health care, the U.S. population is aging and experiencing a shift in demographics, and the use of home health care is expected to increase. Compared to numerous studies that have documented racial disparities between and within hospitals, ambulatory care clinics, and nursing homes, there are only three studies that have examined racial disparities in the quality of home health care. Peng and colleagues (2003) analyzed social support and health status outcomes of White, African American, Hispanic, and Asian patients using the OASIS data from a single home healthcare agency. They found that at discharge African American patients had no supportive services compared to the three other groups and that compared to White and African American patients, Hispanic and Asian patients showed more impairment in instrumental activities of daily living (Peng et al., 2003). Brega and colleagues (2005) examined differences in functional outcomes of home healthcare users using a nationally representative sample from the OASIS data. Brega et al. (2005) controlled for functional status on admission and found that African American patients had significantly poorer outcomes compared to White patients. Finally, Towne and colleagues (2015) compared home healthcare quality of care outcome measures for home healthcare agencies located in areas with a high concentration of Native Americans/Alaskan Natives to that of home healthcare agencies located in areas with a low concentration of Native

Americans/Alaskan Natives. They found that home healthcare agencies located in areas with a higher concentration of Native Americans/Alaskan Natives had poorer quality outcome measures compared to agencies located in areas with a low concentration of Native Americans/Alaskan Natives (Towner et al., 2015). These studies provide an indication that racial disparities in the quality of home health care likely do exist, but further research is needed to both document the existence of racial differences and begin to identify their causes.

Home health care is going to become increasingly important as the demographic landscape of the United States begins to shift. Currently, Americans over the age of 65 make up 13% of the total population. However, the oldest of the 76 million baby boomers have begun to turn 65 and by the year 2030 there are projections that 20% of the U.S. population will be 65 and older (Feng, Fennell, Tyler, Clark, & Mor, 2011; Administration on Aging, 2014). In addition, the number of older racial and ethnic minorities is expected to increase at a significant rate as well: The percent of African Americans over the age of 65 is expected to double from 1% to nearly 2% by the year 2030 (Feng et al., 2011; Administration on Aging, 2014). Also, the number of younger Americans—those who are working-age and children—will decrease as a percentage of the population (Passel & Cohn, 2008), meaning baby boomers will likely need to rely more heavily on outside resources for their health needs as they age. Finally, in 2014 non-Hispanic Whites made up 62.1% of the U.S. population (U.S. Census Bureau, 2015). By the year 2050, Whites are expected to be a minority, accounting for only 47% of the total population (Smedley et al., 2003; Passel & Cohn, 2008).

With this increase in older Americans comes a likely increase in use of long-term care services—both nursing home and home health care. Spending on home health care in the United States was about $70 billion in 2010 (for nursing home care the number was $143 billion in

2010) and is expected to increase to approximately $156 billion by 2024 (nursing home care is expected in increase to $274 billion in 2024) (CMS, 2015a). And although nursing home care has long been the dominant force in long-term care and will continue to play a considerable role, home health care is becoming a significant part of the range of long-term care services provided to elderly and disabled individuals (Jung, Shea, & Warner, 2010; Stone, 2004). Use of home health care is expected to increase for several reasons: home health care is the preferred option for older and disabled individuals, home health care is typically a less expensive option, states are seeking ways to reduce costs by shifting funding to non-institutional services, and The Affordable Care Act of 2010 contains several provisions such as expanding the Medicaid Home and Community Based Services program and improving the direct care workforce that promote the increased use of home health care (Feng et al., 2011; Henry J. Kaiser Family Foundation, 2010).

Given the projected demographic changes in the U.S. population and the expected increase in the use of home health care, it is likely that a significant number of home health patients will be members of a racial or ethnic minority group. Thus, it is important to identify any differences in quality of home health care that currently exist and develop interventions and policies that can reduce or eliminate these differences. Therefore, by identifying and assessing the impact of specific factors that might contribute to differences in quality of home health care, the proposed study has the potential to result in the development of interventions that could lead to improved quality at *High AA HHAs* and thus reduce differences in quality of home health care.

This study also has the potential to significantly influence policy related to home health care. Broad approaches to improving overall quality of care, such as traditional pay for performance and public reporting of quality measures, can have the unintended effect of

increasing disparities in care (McHugh et al., 2010; Smith, Dynan, Fairbrother, Chabi, & Simpson, 2012; Werner, Konetzka, & Kruse, 2008). The premise behind pay for performance is that hospitals and other healthcare organizations are held accountable for their actions and that withholding reimbursement for preventable adverse events (e.g., falls) will provide healthcare organizations with extra incentive to prevent these adverse events from occurring (Smith et al., 2012). However, organizations that disproportionately care for African American patients (and those that care for a high percentage of other minority groups) often do not have the resources to implement quality improvement initiatives and are therefore not able to achieve the improvement in quality indicators needed to receive increases in Medicare reimbursement associated with pay for performance (McHugh et al., 2010; Werner, Goldman, & Dudley, 2008).

By identifying the factors that contribute to limited resources and how resource constraints might affect quality of care at *High AA HHAs*, this study has the potential to provide policy makers with new leverage points for intervention such as redesigning pay for performance schemes to more adequately support the implementation of quality improvement initiatives at home healthcare agencies that face resource constraints (Konetzka & Werner, 2009).

Organization of the Dissertation

The remainder of the dissertation is organized as follows: In Chapter 2, the conceptual model will be discussed; Chapter 3 will present a review of the literature of factors—market, community, organizational, and nurse staffing—that will be investigated as potential contributors to differences in the quality of home health care; Chapter 4 will provide a discussion of the methodology of the study, including research design, sample, measures, data sources, data analysis, and potential analytical issues; Chapter 5 will present the results of the statistical analyses; and Chapter 6 will be a discussion of the results.

CHAPTER 2: THEORETICAL FRAMEWORK

Introduction

Theories have not been used to guide the majority of disparities research and this has contributed to a limited understanding of the concepts that might be important in understanding the causes of disparities in quality of care and thus researchers' ability to design successful interventions. Therefore, this study is guided by the theory of institutional racism. The theory of institutional racism posits that the policies and practices of social institutions, regardless of intentionality, can result in racial inequality for African Americans (and other minority group members) (Better, 2008; Feagin & Feagin, 1986; Ture & Hamilton, 1992). Since the late 1960s when Stokely Carmichael (later known as Kwame Ture) and Charles Hamilton described institutional racism in their book "Black Power: The Politics of Liberation in America," researchers have been examining how intentionally and unintentionally racist policies and practices of social institutions in the United States perpetuate racial inequalities (Berard, 2008; Better, 2008; Jones, 1997; Ture & Hamilton, 1992). Using the theory of institutional racism provides a potentially useful approach to identifying and explaining how the policies and practices of social institutions transmit racism and therefore might contribute to differences in the quality of home health care (Griffith et al., 2007).

The purpose of this chapter is to explain the theory of institutional racism and to describe the conceptual model used for this study. The chapter begins with an explanation of race and racism, which provides the foundation for a discussion of the theory of institutional racism. This is followed by a description of the theory, including its origins, mechanisms, and limitations, and

the rationale for using the theory of institutional racism to guide this study. The chapter concludes with a discussion of how the theory of institutional racism influenced the development of the conceptual model—which shows market, community, organizational, and nurse staffing characteristics reflecting various types and sources of institutional racism stemming from policies and practices of social institutions—and contributes to differences in quality of home health care between *High* and *Low AA HHAs*.

Race and Racism

Race

Early Greek philosophers such as Plato and Aristotle speculated that slaves, who were often of different origins than Greeks, were inferior to non-slaves (Byrd & Clayton, 2001a). As they and other Greek philosophers worked on classifying human beings, slaves were assigned a lesser status based on a belief that slaves were biologically and intellectually inferior to the majority. This ranking of human beings was the recorded beginning of using race as a means of separating groups of individuals based on outward appearances (Byrd & Clayton, 2001a). Following in the path of the Greek philosophers, Galen, a Roman physician who had Greek origins, believed that darker-skinned individuals were physically and psychologically inferior to the light-skinned majority. Galen's teachings had a significant influence on Western medicine and culture and were widely accepted by physicians and others in the field of medicine, as well as philosophers, politicians, religious scholars, and clergyman (Byrd & Clayton, 2001a). As time progressed through the Renaissance and Age of Enlightenment, although philosophers and others promoted principles of freedom, they also continued to advance ideas of inequality, including that dark-skinned individuals were subhuman and were not descended from Adam and Eve as they believed were light-skinned individuals (Byrd & Clayton, 2001a). Several prominent individuals from the medical and scientific communities such as Anton van Leeuwenhoek,

Marcello Malphighi, and Carl Linnaeus hypothesized that dark-skinned individuals were defective and inferior to Whites, providing support for and lending credence to the widely held beliefs of White superiority (Byrd & Clayton, 2001a). Early English settlers and colonists brought these beliefs—that there were inherent biological differences between light- and dark-skinned individuals—to the English colonies in what would become America, where they had tremendous influence over the development of American culture.

Scientists, philosophers, and lay people now understand that there are far fewer significant biological differences within the human species than previously thought and that outward features such as hair texture and facial structure have no impact on intelligence, behavior, susceptibility to disease, or anything else (Better, 2008; Byrd & Clayton, 2001a). Race is now understood as principally a social construct—that is, society (the dominant group) gives meaning to the outward differences between humans and determines racial classification (Better, 2008). Thus, the meaning of race can change over time as social relations and contexts change. For example, in the United States, Jewish and Irish immigrants, although light-skinned, were not considered "White" for many years after their arrival in the country and were subject to intense discrimination. Now, however, people of Jewish and Irish descent are considered "White" (though some are still discriminated against) while similarly light-skinned individuals from areas such as the Middle East or Mexico and Central America are often treated as inferior (Better, 2008; Jones, 1997). Despite this understanding that physical features have no relation to intelligence, behavior, and so forth, individuals continue to be classified into specific groups based on physical features and these groups are often treated differentially (Better, 2008; Byrd & Clayton, 2001a).

Racism

Racism is the mechanism by which members (or a single individual) of one group are oppressed and persecuted (Better, 2008; Byrd & Clayton, 2001a; Jones, 1997). Interestingly, racism can be directed at members of minority or majority groups. It is an act or practice that is rooted in a belief of superiority on the part of the group or individuals perpetuating the racist behavior or acts (Berard, 2008; Byrd & Clayton, 2001a). Racism occurs at different levels, including the individual and institutional level (Jones, 1997). Racism perpetuated by the White majority group will be the focus in this study.

Individual racism. At the individual level, racism is a specific action by an individual, often based on a belief in the superiority of one's own race that has negative consequences for a disadvantaged individual or group (Better, 2008; Jones, 1997). There are different types of individual racism, the two described here are "dominative" and "aversive" (Jones, 1997). The "dominative" individual is one who acts openly on his beliefs that Whites are superior to African Americans (or any other racial minority group) (Jones, 1997). This is the individual who would commit acts of violence against African Americans to perpetuate racial inequality. Such behavior is often referred to as overt racism—it is racism that is out in the open for all to see and hear. Although overt individual acts such as these have decreased in recent years, they do still occur (Better, 2008; Jones, 1997). For example, there are numerous instances of politicians (and others) making "off-camera" remarks about minority groups, often referring to a specific group having a lack of interest in working or being "takers."

The aversive individual believes in the cultural superiority of Whites and acts in a covert rather than overt manner. Thus, this type of racism is often called "covert racism." In contrast to overt racism, cultural criteria are typically invoked as a reason for covert racism (Jones, 1997). This is the individual who avoids African Americans—he might refuse to live in a neighborhood

with African American families because he thinks that African Americans do not have the same cultural standards as Whites (Jones, 1997). As another example, some Whites do not want their children educated in the same classroom (or school) as African American or other minority children because the minority children "do not have a good work ethic" and they are afraid this will affect their children. This type of racism is hidden and it is one type of racism that pervades American society today (Better, 2008; Feagin, 2006; Jones, 1997).

Institutional racism. In comparison, institutional racism can be defined as intentionally or unintentionally racist policies, practices, and procedures of social institutions that produce and maintain racial inequalities (Better, 2008; Jones, 1997). Not all policies and practices of social institutions are racist or have racist outcomes. Indeed, some help protect members of society from harm, socialize young people, and maintain the general health of the society (Trepagnier, 2010). However, policies and practices of social institutions can also serve to maintain racial inequality, either intentionally or unintentionally (Jones, 1997).

Social institutions are created by individuals, operate in all societies, and serve to reduce uncertainty by providing structure and stability to social life (Better, 2008; North, 1991; Scott & Davis, 2007). The policies and practices of social institutions are the rules, both formal and informal, that constrain the choices of individual members of society (North, 1991). These formal and informal rules regulate the environment and interactions and tell people what is acceptable and unacceptable. For example, the Constitution of the United States, part of the social institution of government, created formal laws that citizens are compelled to follow or face penalties (North, 1991). As another example, the U.S. Congress, again part of the social institution of government, passed The Civil Rights Act in 1964 and Medicare legislation in 1965 (Smith, 2001). When the Medicare program was implemented, hospitals were required to comply

with the formal law of Title VI of The Civil Rights Act of 1964 (i.e., integrate their hospitals) or face the penalty of not receiving Medicare funding (Smith, 2001). Thus, the choices of segregated hospitals—to integrate or not—were constrained by the law. In contrast, an informal rule could be the unwritten rules that perpetuate continued racial discrimination in the housing market (Smedley et al., 2003). Recent housing audit studies have indicated that African American auditors (e.g., individuals posing as buyers) were shown fewer housing options compared to White auditors and that African American auditors were steered away from "White" neighborhoods (Smedley et al., 2003). Because The Fair Housing Act of 1968 barred discrimination in housing, such practices cannot be written down or made legitimate but are rather the result of a shared understanding among those in the housing market (Better, 2008; Scott & Davis, 2007; Smedley et al., 2003). These informal rules, also part of the fabric of the social institution of the housing market, constrain the choices of African Americans and contribute to the continued residential racial segregation that is evident today (Better, 2008; Smedley et al., 2003).

Individuals and groups can choose to follow or ignore the rules created by social institutions, but regardless, there are consequences—positive and negative—for either decision (North, 1991; Scott & Davis, 2007). For example, the majority of hospitals complied with Title VI of The Civil Rights Act without incident, not necessarily because they believed in integration but because they did not want to lose the additional revenue Medicare would provide (Smith, 2001). Those hospitals that fought Title VI regulations ultimately lost out on additional Medicare revenue, either until they capitulated and complied with the law or completely if they chose never to comply. In addition, a real estate agent might choose to abide by the unwritten rule of refusing to show African Americans houses in a "White" neighborhood as a way to gain favor

with other influential agents or to avoid social penalties that might result (Scott & Davis, 2007). Thus, individuals or groups might choose to comply with the formal and informal rules of social institutions as a way to obtain rewards rather than on the basis of their agreement with the rule (North, 1991; Scott & Davis, 2007).

The norms and values of society are also transmitted through these formal and informal rules (i.e., institutional policies and practices) stemming from social institutions. For example, the norm of what defines racism has shifted over the past 50-plus years, since the civil rights era. In the years before the Civil Rights Act of 1964, intentional overt racism and discrimination were the norm in the United States and this was reflected in institutional policies and practices such as segregation in the educational and healthcare systems (Better, 2008; Jones, 1997; Smith, 2001). Since the Civil Rights Act of 1964 was passed, unintentional and covert racism have slowly become the norm in the United States (Better, 2008; Jones, 1997). Such a change is reflected in the slow transition of policies and practices of social institutions from being intentionally to unintentionally racist (Better, 2008; Jones, 1997; Smith, 2001). At one time it was socially acceptable, especially in the South, to use threats of violence (e.g., shooting, cross burning, lynching) and enforced segregation, which were supported by some social institutions (either formally or informally), as a way to try to keep Whites and African Americans separate (Better, 2008; Ture & Hamilton, 1992). As norms and values in the United States evolved over the years, intentionally racist policies and practices were outlawed and most Americans would say they consider such acts to be unacceptable (Better, 2008; Jones, 1997; Smith, 2001; Trepagnier, 2010).

Still though, there are numerous examples of unintentionally racist policies and practices of social institutions that continue to be widely accepted and result in racial inequality for

minority groups (Better, 2008; Jones, 1997; Smith, 2001). For example, Medicare is part of the social institution of health care. It was created—along with its numerous policies and practices—to provide access to health care and combat unequal treatment for older adults (over the age of 65) and disabled individuals in the United States, regardless of race or socioeconomic status (Smith, 2001). And Medicare has been successful in that many older adults and disabled individuals who did not have healthcare coverage have been able to access health care and the overall health of these at-risk populations (i.e., older adults and disabled individuals) has improved since the Medicare program was established (Smedley et al., 2003; Smith, 2001). At its inception, Medicare provided hospitals with a new source of revenue that enabled them to expand or build new hospitals. When Medicare was implemented in 1966, White flight" out of the inner cities as a way to avoid integration had already begun (Smith, 2001). Eager to target the more lucrative Medicare population now located in the suburbs, numerous administrators made the decision to close inner city "Black" hospitals (or merge these with "White" hospitals) and use new Medicare dollars to build new hospitals in the suburbs (Smith, 2001). Thus, although the purpose of Medicare funding to hospitals was to increase access to care for older adults and disabled individuals and improve their health, one of the initial negative consequences was that access for African Americans (older adults and others in the community), few of whom lived in the suburbs in the 1960s and 1970s, decreased and, in turn, their health status suffered (Smith, 2001). This is an unfortunate but clear example of the negative effects for African Americans of an unintentionally racist practice stemming from a social institution.

As described above, both types of racism are harmful to racial minorities, but institutional racism can cause widespread racial inequality because of the power social institutions have to affect the lives of numerous individuals through policies and practices (Better, 2008; North,

1991).Thus, in the next section the theory of institutional racism will be described in further detail, including a description of the origins of institutional racism, a comparison of direct and indirect institutional racism, factors that serve to maintain institutional racism, and the limitations of the theory of institutional racism. In addition, the rationale for using the theory to guide this study will be discussed.

Theory of Institutional Racism

Origins of Institutional Racism in the United States

Individual racism. Institutional racism in the United States is rooted in individual racism. As the British colonized North America in the seventeenth century, they brought with them their nearly universal belief in the biological, intellectual, and cultural inferiority of dark-skinned individuals, particularly those of African descent (Byrd & Clayton, 2001a). In addition, British colonizers also believed in the immutability of these differences—that there was nothing that could be done to change the "nature" of dark-skinned individuals so there was no reason to treat dark-skinned individuals as equal to Whites or to allow them to mix with Whites because their inferior status might "taint" White people (Byrd & Clayton, 2001a).

These beliefs of White superiority were supported, almost universally, by the scientific, legal, political, and religious scholars of the day. Thus, individual beliefs were rationalized and legitimized by social institutions such as the church and scientific community and were subsequently used to justify the enslavement of people of African descent (Byrd & Clayton, 2001a). These beliefs became embedded in the consciousness of Americans, have influenced the creation and implementation of institutional policies and practices, and persist today, though more often in the fabric of America's social institutions if not the conscience of its people (Better, 2008; Jones, 1997; Jones, 2000; Sue et al., 2007).

Slavery and the pre-Civil Rights era. British settlers came to North American in search of religious freedom and new economic opportunities and were intent on establishing permanent colonies (Byrd & Clayton, 2001b). Thus, it became necessary for these early settlers to clear and farm the land and create a workforce to sustain and grow the economy of the colonies. Initially, European indentured servants and American Indians were used by colonists to farm the land, but both were later replaced by Black Africans (Byrd & Clayton, 2001b). Black Africans were chosen for several reasons, including that they were easy to track and identify and, unlike indentured servants and American Indians, had no allies in the colonies. But it was the beliefs of the colonists that Black Africans were biologically, intellectually, and culturally inferior to Whites—which were supported by scientific and religious scholars—that provided the justification for the establishment and perpetuation of the institution of slavery (Byrd & Clayton, 2001b).

The enslavement of Black Africans provided the early British colonizers and, later, Americans with a cheap and abundant source of labor and thus White land owners were able to accrue significant wealth that was passed on for generations (Better, 2008; Byrd & Clayton, 2001a). To support and sustain the institution of slavery and the resulting White economic and social privilege and power, racism became embedded in other institutions such as education, housing, and health care (Better, 2008; Byrd & Clayton, 2001a). For example, the institution of slavery required that slaves be kept ignorant and therefore they were not educated in the traditional schools that were used for Whites, and thus racism became embedded in the social institution of education. If slaves were allowed an education, they might rebel against their owners, causing disruption in what was then a slave-based economy (Better, 2008). Slaves were only taught "Bible learning," including that subservience to their masters and segregation was

God's will. If slaves had been allowed an education, they might have gained broader knowledge that would have made it more likely that they would resist being enslaved (Better, 2008). In addition, slaves were closely guarded and forced to live in separate housing from Whites because there was always the possibility they might flee or somehow injure White owners or their families (Better, 2008). Thus, racism became embedded in the social institution of housing. All of these policies and practices served the purpose of reinforcing the idea that slaves were inferior to Whites and that they should be kept separate from Whites (Better, 2008).

The social institution of health care was also affected by the institution of slavery. Because slaves were deemed biologically inferior to Whites, there was a belief that they did not deserve, or need, the same type of health care that Whites received. Slaves were cheap labor and it was the rare slave who was deemed so important to his owner that he was provided health care similar in quality to that of Whites (Byrd & Clayton, 2001a). Thus, a healthcare system separate from and inferior to the developing White healthcare system was established (Byrd & Clayton, 2001a). When free Black Africans or slaves were in need of health care, their choices were limited to slave midwives, plantation owners' wives, traditional African healers, or dangerous hospital facilities (poorhouse hospitals or dirty almshouses). The nation's earliest hospitals, established in the mid- to late eighteenth century, discriminated against free Black Africans (Byrd & Clayton, 2001a).

As America entered the nineteenth century, slavery continued, as did the assumptions that slaves and other dark-skinned individuals were inferior and that their poor health was the normal result of this inferiority (Byrd & Clayton, 2001a). Even when slavery was abolished after the Civil War, professionals in the social and natural sciences continued to write and publish theories of Black biological, intellectual, and cultural inferiority. These writings had a profound effect on

the nation's healthcare system and the reforms that took place in the late nineteenth and early twentieth centuries (Byrd & Clayton, 2001a). New hospitals, such as Johns Hopkins Hospital, were established with a policy of racial segregation. These hospitals not only cared for patients but they trained physicians, nurses, and other healthcare providers. Thus, physicians, nurses and other healthcare providers educated from the late nineteenth century until the 1960s were taught that segregation was the norm and that Black Americans did not need or deserve the same care as Whites given their inferior status (Better, 2008; Byrd & Clayton, 2001a).

Thus, a two-tier system—one for the White majority and one for African Americans and other racial minorities—with policies and practices designed to sustain racial inequality was established in nearly every social institution in America as a result of the need to support the institution of slavery and to maintain White economic and social privilege (Better, 2008). As the institution of slavery was dismantled and replaced by Jim Crow laws, which were then outlawed by The Civil Rights Act of 1964, the more overtly racist policies and practices disappeared, only to be replaced by other policies and practices that continue to result in White economic and social privilege and racial inequality (Better, 2008).

Mechanisms of Institutional Racism

Racial inequality is perpetuated by the intentionally or unintentionally racist policies and practices that are created and implemented by social institutions. Regardless of intentionality, the result is the same—perpetuation of racial inequality (Feagin & Feagin, 1986). However, distinguishing between intentional and unintentional racism is important because the mechanisms for producing racial inequality are different and therefore the interventions will be different.

Direct institutional racism. The term *institutional racism* was first used in the 1960s by Stokely Carmichael (later known as Kwame Ture) and Charles Hamilton in their book "Black

Power: The Politics of Liberation" (Ture & Hamilton, 1992). They defined institutional racism as covert acts of racism (racist policies and practices) on the part of social institutions that are rooted in a sense of superiority on the part of the majority group and supported by individuals (Ture & Hamilton, 1992). Thus, Ture and Hamilton (1992) attribute institutional racism to Whites as a group, arguing that the "White power structure" in the United States supports racist institutional policies and practices that result in problems such as the high infant mortality rate for African American children and continued residential racial segregation (Berard, 2008).

The type of institutional racism described by Ture and Hamilton (1992) is referred to by Feagin and Feagin (1986) as *direct institutional racism*. The direct form of institutional racism exists when institutions develop and use policies and practices that are *intentionally* designed to cause harm to racial minority groups (Feagin & Feagin, 1986). These policies and practices can be blatant and obvious or subtle and covert (Feagin & Feagin, 1986). Though examples of direct institutional racism still exist (e.g., gerrymandering of voting districts, school board decisions to have children go to "neighborhood" schools; selective advertising of unskilled or low-skill jobs), they have declined since the adoption of The Civil Rights Act of 1964 (Berard, 2008: Jones, 1997).

Indirect institutional racism. Feagin and Feagin (1986) also define a second, more common type of institutional racism. *Indirect institutional racism* is defined as institutional policies and practices that *unintentionally* cause harm to racial minority groups. Policies and practices of social institutions are not designed intentionally to produce negative outcomes for racial minority groups but do so nevertheless (Berard, 2008; Feagin & Feagin, 1986). The policies and practices of a social institution can be influenced either by its own past actions or by the policies and practices of other social institutions (Better, 2008; Feagin & Feagin, 1986;

Jones, 1997). Thus, the unintentionally racist policies and practices of a social institution are, indirectly, the result of racism in either a) another institution ("side-effect" racism) or b) an institution's own past ("past-in-present" racism) (Berard, 2008; Feagin & Feagin, 1986). Most institutional policies and practices now fall into the category of indirect institutional racism (Better, 2008; Feagin & Feagin, 1986; Jones, 1997) and it is these policies and practices of social institutions that are the focus of this study.

Side-effect racism. In side-effect racism the policies and practices of one social institution can be influenced by other closely related institutions (Better, 2008; Feagin & Feagin, 1986). Thus, the policies and practices of the social institution of health care can be affected by the policies and practices of institutions such as banking, housing, and education. For example, minorities often live in highly segregated communities partially as a result of racist lending policies that were established when discrimination was legal (Williams & Collins, 2001). These communities generally lack an adequate tax base and community resources and thus have poor-quality schools. The practices of these schools are such that they do not adequately prepare students for college, not necessarily because the institution of education is racist but because the schools in segregated communities lack the resources to provide a high-quality education (Williams & Collins, 2001). These students then are not able to go on to college—an outcome that results in systematic disadvantage for minority students. Because these minority students do not go to college, there are fewer minority healthcare providers such as physicians, nurse practitioners, and registered nurses (King, 1996). Fewer minorities in the medical profession can lead to disparities in care because White healthcare providers continue on with the "business as usual" policies and practices of the healthcare system—practices that might not be sensitive to needs of minority patients and the challenges they face (Das, Olfson, McCurtis, & Weissman,

2006; Smedley et al., 2003). Thus, the intentionally racist lending policies and practices of the social institution of banking had an influence, indirectly, on policies and practices of healthcare organizations. As a result, African Americans continue to receive poorer quality of care, which has been identified as one of the factors contributing to poorer health outcomes for African Americans (Smedley et al., 2003).

Past-in-present racism. In past-in-present racism, a social institution's own past intentionally or unintentionally racist policies and practices have affected current policies and practices, which are unintentionally racist and result in harm to racial minority groups (Feagin & Feagin, 1986). An example of how past-in-present racism in the institution of health care has resulted in continued racial inequality for African Americans is the past use of African Americans, without their consent, for clinical research that was risky or experimental (Byrd & Clayton, 2001a). Because African Americans were considered inferior to whites, medical researchers felt justified in using African Americans, covertly, as part of clinical research. The most prominent example of this was the Tuskegee experiment, conducted for over 40 years, in which treatment was withheld for rural, poor, and illiterate African American men with syphilis in an effort to understand the full range of the disease (Byrd & Clayton, 2001a). The men were not told what was happening to them and many either died as a result of the experiment or experienced illnesses and complications that could have been prevented (Byrd & Clayton, 2001a).

Another more recent example of the healthcare system's exploitation of African Americans is that of Henrietta Lacks (Byrd & Clayton, 2001b; Skloot, 2010). Henrietta Lacks was a young African American mother who was diagnosed with cervical cancer and treated at a segregated Johns Hopkins Hospital in 1951 (Skloot, 2010). Without her knowledge, cells from

her tumor were taken and grown in a lab. Unlike other human cells that died when scientists attempted to grow them in a laboratory setting, Henrietta Lacks's cells flourished (Skloot, 2010). Her cells—called HeLa cells—have been and continue to be used by researchers around the world (Byrd & Clayton, 2001b; Skloot, 2010). HeLa cells have been used in research on the polio vaccine, cancer, and influenza; to develop drugs to treat cancer, Parkinson's disease, and many others; and even to study things like mosquito mating (Byrd & Clayton, 2001b; Skloot, 2010). Despite all the advances her cells have contributed to and the billion-dollar industry of HeLa cells, Henrietta Lacks's family has not received any compensation and several members of her immediate family are without health insurance or are under-insured (Byrd & Clayton, 2001b; Skloot, 2010). As a result of these abuses and others, many African Americans have significant distrust not only in the U.S. healthcare system but also for clinical research.

There is now an effort to include African Americans (and other minorities) in current clinical research, but many continue to be skeptical and refuse to participate (Byrd & Clayton, 2001a; Smedley et al., 2003). Numerous treatments (including medications, lifestyle modifications, and others) that have been developed in the years since the Tuskegee experiment have been based on Whites (in particular White men) and there is a lack of knowledge as to how such treatments might differentially affect African Americans (and other minorities). For example, it is known that African Americans metabolize anti-depressant medications differently than Whites, but there is little research indicating the correct starting dosage for African Americans patients who are depressed (Bailey, Blackmon, & Stevens, 2009; Das et al., 2006; Schraufnagel, Wagner, Miranda, & Roy-Byrne, 2006). These depressed patients then end up experiencing unnecessary side effects and frequently stop using the medication. As a result, African American patients diagnosed with depression often go untreated, endure worse

depression, and experience more complications, than Whites (Bailey et al., 2009; Das et al., 2006; Schraufnagel et al., 2006). Thus, the prescribing practices of providers are not intentionally racist, but due to past intentional racism in the institution of health care the result is poorer health status for African Americans.

Factors that Maintain Institutional Racism

There are several factors that help maintain institutional racism, the most important of which is that institutional racism results in economic privilege and power for Whites (Better, 2008). During the time of slavery, numerous White land owners were able to significantly increase their profits by keeping Black Africans as slaves and using them for inexpensive labor (Better, 2008; Byrd & Clayton, 2001b). Although some White land owners became wealthy and secured tremendous power that was passed on to subsequent generations, there were also small farmers who kept slaves and benefited from their labor, but they did not acquire the same wealth and power. Whites used this power, even after the abolishment of slavery, to establish Jim Crow laws that perpetuated a two-tier labor market—one that continues to disadvantage African Americans and other minority group members to this day (Better, 2008). Today, African Americans and other minorities are more likely than Whites to have dangerous, low-paying, and non-skilled jobs. They are more likely than Whites to have jobs with few or no benefits and to be the first ones fired (Better, 2008). Thus, the White majority is able to retain its power and resources (economic privilege) because White males (i.e., the ones who want to keep power and privilege) are often the ones who have designed the policies and practices of social institutions that help maintain the status quo (Better, 2008).

In addition to the two-tier job market, Whites also have advantages in terms of health when compared to African Americans—Whites enjoy a significantly longer life span and lower mortality and infant mortality rates (Smedley, et al., 2003; Smith, 2001; Williams, Mohammed,

Leavell, & Collins, 2010; Woolf & Braveman, 2011). This health gap is the result of many complex factors, often referred to as social determinants of health, including but not limited to: individual risk factors such as age, sex, and genes; environmental health risks such as air and water pollution; individual health behaviors (e.g., non-adherence to treatment); poor living and working conditions; lower-quality education; lower access to health care; and poorer quality of health care (Smedley, et al., 2003; Smith, 2001; Williams et al., 2010; Woolf & Braveman, 2011). This poorer health status and higher mortality rate results in continued economic disadvantage for African Americans and contributes to Whites maintaining economic power and privilege (Smedley et al., 2003). Many of the above-mentioned social determinants of health are the result of institutional policies and practices (e.g., racial segregation as the result of lending policies of banks) designed and implemented by Whites and ones that help maintain power and privilege for the White majority (Better, 2008).

Institutional racism is also maintained by the belief on the part of the majority that it is the norm for African Americans to have a lesser status than Whites (Better, 2008; Byrd & Clayton, 2001a; Ture & Hamilton, 1992). Americans have been socialized to believe that it is the norm for African Americans to have a higher unemployment rate because they are lazy or their culture is poor; that African Americans have different genes and thus it is the norm that they have poorer health and a shorter life expectancy; and that African Americans "want to be with their own kind" and live in the inner city and thus segregation is an acceptable result of this desire (Better, 2008; Jones, 2000; Sue et al., 2007). Such socialization has given Americans the belief that racial inequality is the norm and therefore it is not, and could not, be that the policies and practices of social institutions are racist (intentionally or unintentionally) but that the status of African Americans is "just the way things are" (Better, 2008; Jones, 2000; Sue et al., 2007).

Individuals in social institutions, including healthcare providers, often continue on with "business as usual" because they have no reason to question the institutional policies and practices and the resulting racial inequality or because they do not see the consequences of racial inequality (Better, 2008; van Ryn & Fu, 2003).

Unfortunately, healthcare providers are not immune to this socialization and they too may hold beliefs, consciously or unconsciously, that result in a conscious or unconscious negative attitude toward African American and other minority patients (Smedley et al., 2000; Sue et al., 2007). Such beliefs are brought to the clinical encounter and may affect diagnostic and treatment decisions (Smedley et al., 2003; van Ryn, 2002). These beliefs might also cloud healthcare providers' view of the existence of racial disparities, therefore contributing to a continuation of the "business as usual" approach to health care. The result of such an approach is that African American and other minorities continue to receive health care that is of poorer quality compared to White Americans (van Ryn, 2002).

Finally, institutional racism is maintained by the norm of whiteness (Better, 2008). That is, the American culture is based on whiteness and the policies and practices of social institutions favor the dominant culture (Better, 2008). For example, the expectation in most businesses is that individuals speak and dress a certain way—specifically the way White males and females speak and dress. In applying for a job, if an individual does not adhere to the dominant cultural norms, there is the likelihood that the individual will not get the job or might get a lower-paying job (i.e., one for which he is over-qualified) (Better, 2008; Smedley et al., 2003). Such standards unfairly limit the opportunities afforded to African Americans (and other minority group members) and lead to the continued accrual of power and privilege for the dominant group. The

dominant group is thus able to keep control of social institutions and continue to create and maintain policies and practices that perpetuate racial inequality (Better, 2008).

Limitations of the Theory of Institutional Racism

There are some limitations to using the theory of institutional racism as a guide for this study. The theory of institutional racism was developed to explain the systemic nature of racism; that is, that racism permeates society not only through individual racist actions but also through the actions of institutions (Trepagnier, 2010; Ture & Hamilton, 1992). Such a conceptualization provided scholars with a new way of understanding the persistence of racial inequalities, even in the post–civil rights era when overt displays of discrimination have begun to decline (Berard, 2008; Trepagnier, 2010). However, because of the decline in overt individual racism, most scholars typically only focus on institutional racism at the macro-level—the racial inequalities that are considered the result of institutional racism—while largely neglecting questions about what is happening at the micro-level—how the beliefs, intentions, and actions of individuals who make up social institutions lead to the development and implementation of institutional policies and practices (Berard, 2008; Trepagnier, 2010). This may be a significant limitation, neglecting an opportunity to understand how the micro-level processes lead to the macro-level outcomes (Berard, 2008; Trepagnier, 2010).

In addition, institutional racism is often defined solely in terms of the negative effects of institutional policies and practices on African Americans and other minority group members. That is, scholars typically define institutional racism as the persistent racial inequalities that are observed such as continued residential racial segregation or the high infant mortality rate among African American infants (Berard, 2008; Trepagnier, 2010; Ture & Hamilton, 1992). However, there is little knowledge of the individuals who make up these institutions (and create their policies and practices) and how policies and practices of social institutions actually *produce* the

observed racial inequalities (Berard, 2008; Trepagnier, 2010). There has been some research on the role of healthcare providers' contribution to racial disparities in quality of care. However, few researchers have investigated the provider role as part of the larger picture of institutional racism, focusing instead on what can be done at the individual level (i.e., improving cultural competence) (Griffith et al., 2007). Given that many Americans are often unaware of their own racial attitudes and stereotypes, such interventions have not proven to be effective in reducing disparities in the quality of care because individuals often think the programs are directed at those who are overtly racist (Griffith et al., 2007; Smedley et al., 2003; Sue et al., 2007). Therefore, included in any conceptualization of institutional racism should be some way to understand how institutional policies and practices actually lead to racial disparities, taking into consideration the human element.

Finally, most conceptualizations of institutional racism do not address ways to improve institutions (Berard, 2008). This is likely the result of a lack of understanding about the causal mechanisms underlying institutional racism. If there is no knowledge of how racially disparate outcomes are produced, then it is difficult to specify ways to improve outcomes for African Americans and other racial minority groups. There is a need then to understand how institutions work and why their policies and practices, often unintentionally racist, produce outcomes of racial inequality (Berard, 2008).

Rationale for Using the Theory of Institutional Racism

Despite its noted limitations, the theory of institutional racism is useful for providing a preliminary understanding of the how unintentionally racist institutional policies and practices result in racial differences in the quality of home health care. Most disparities research has focused on how providers perpetuate racial disparities, largely neglecting the role of social institutions (Griffith et al., 2007; Smith, 2001). This has resulted in a partial understanding of

racial disparities in quality of care and the creation of policies and interventions that have generally been unsuccessful in reducing disparities in care (Griffith et al., 2007).

Currently, few researchers and policy makers take into account the role of institutions in perpetuating racial disparities in the quality of health care (Griffith et al., 2007). Before examining the role of individuals in creating and perpetuating institutional policies and practices that result in negative outcomes for racial minority groups (the micro-level of institutional racism), there needs to be an understanding of institutional racism at the macro-level; that is, whether and which policies and practices of social institutions contribute to racial disparities in the quality of health care. Using the theory of institutional racism to guide this study will help develop that macro-level knowledge base. Such knowledge could then be used for future studies where the work of individuals within social institutions could be explored and a macro-micro theory of how institutional policies and practices result in racial disparities in care could be developed.

Conceptual Model Development

The theory of institutional racism posits that the policies and practices of social institutions, regardless of intentionality, result in racial inequality for African Americans (and other minority group members) (Better, 2008; Feagin & Feagin, 1986; Ture & Hamilton, 1992). Because of the interconnectedness of social institutions (e.g., labor, housing, health care), intentional or unintentional racist policies and practices in one or more social institutions can result in unintentionally racist policies and practices in other social institutions (i.e., side effect racism) (Better, 2008; Feagin & Feagin, 1986; Jones, 1997). Intentional or unintentional racism in a social institution's past can also result in current unintentionally racist policies and practices in that institution (i.e., past-in-present racism) (Feagin & Feagin, 1986). Thus, understanding

how policies and practices of a variety of social institutions influence the policies and practices of the institution of health care and contribute to disparities in quality of care for African Americans is a recent and potentially useful approach to identifying the underlying causes of differences in the quality of home health care (Griffith et al., 2007).

Given the lack of research on disparities in quality of home health care, disparities research in the field of nursing homes has helped identify the potential types and sources of institutional racism that might contribute to differences in quality of care between *High AA HHAs* and *Low AA HHAs*. The conceptual model used for this study (Figure 1) proposes that the policies and practices of other social institutions influence the social institution of health care, contributing to differences in the quality of care between *High* and *Low AA HHAs* (Better, 2008). Based on the theory of institutional racism, the variables (grouped by characteristic—market, community, organizational, and nurse staffing) included in the conceptual model (Figure 1) reflect various types and sources of institutional racism that stem from the policies and practices of a variety of social institutions and subsequently influence quality of home health care, thus contributing to differences in quality between *High* and *Low AA HHAs*.

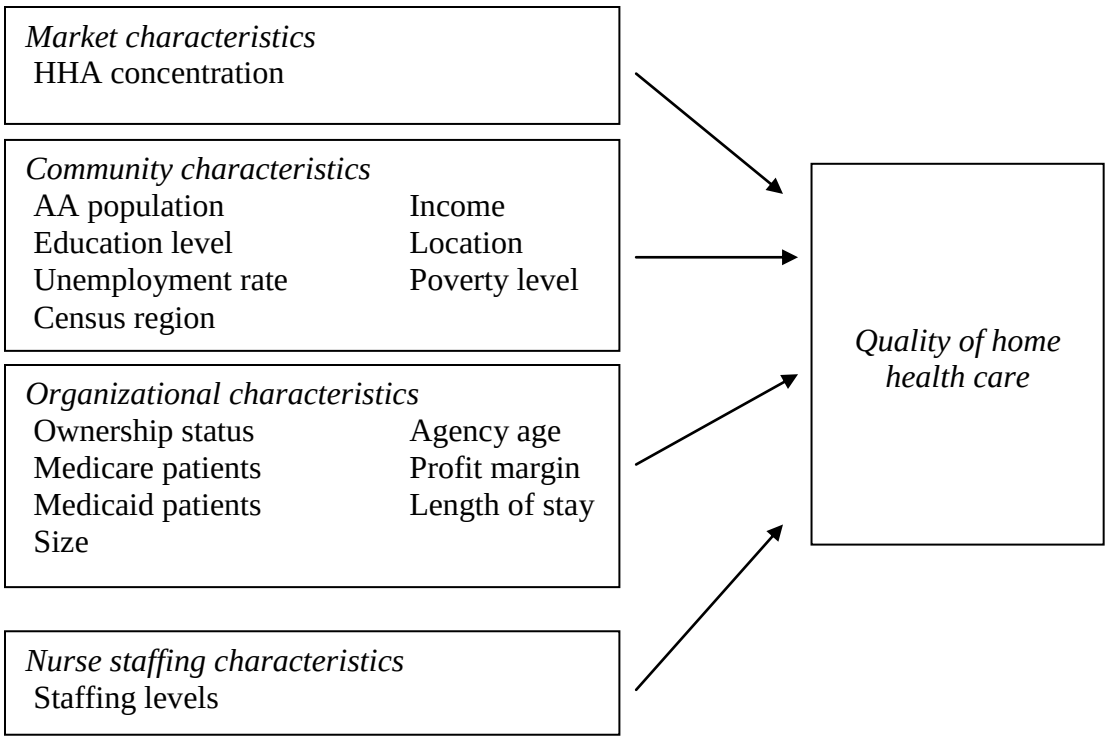

Figure 1. Conceptual model of factors that affect quality of home health care (adapted from Castle & Engberg, 2007).

Summary

This chapter provided an explanation of the theory of institutional racism. It began with a discussion of race and racism followed by an in-depth exploration of the theory of institutional racism, including: a description of the origins of institutional racism, a comparison of two mechanisms of institutional racism, and a discussion of the factors that serve to maintain institutional racism. In addition, the limitations of the theory of institutional racism and the rationale for using the theory for the proposed study were explained. The chapter concluded with a description of the development of the conceptual model. Using this conceptual model as a guide, the next chapter examines the literature home health care and nursing home literature. The literature provides support for the use of the variables that reflect various types and sources of institutional racism.

CHAPTER 3: LITERATURE REVIEW

Introduction

The purpose of this study is two-fold: to document whether racial differences in the quality of home health care exist, and, should they be found, to explore the relationship between specific factors (market, community, organizational, nurse staffing) and racial differences in quality of home health care in an effort to provide information needed to affect policies to decrease racial differences in the quality of home health care. The initial literature search was focused on studies that have examined racial disparities in quality of care between home healthcare agencies; however, no studies were found. Thus, the literature search was broadened to include studies that documented disparities in quality of care in nursing homes, including those studies in which specific factors that might be associated with racial disparities in the quality of care between nursing homes were investigated (Konetzka & Werner, 2009). Because few studies that met these criteria were found, the literature search was expanded again to include studies that investigated predictors of quality in nursing homes and those that have investigated predictors of quality in home healthcare agencies. These studies were included in the literature review because the same factors that influence quality of care might also be related to disparities in quality of care between nursing homes or home healthcare agencies.

The purpose of this chapter is to review the literature addressing disparities in the quality of nursing home care, predictors of quality in nursing homes, and predictors of quality in home healthcare agencies. This chapter will describe studies that have examined the factors (market, community, organizational, and nurse staffing) thought to influence quality of care and thus

contribute to differences in quality between *High AA HHAs* and *Low AA HHAs*. Given the heavy reliance on research from nursing homes for this literature review, a comparison of nursing homes and home healthcare agencies, and the rationale for including studies from nursing homes will be described first, followed by the review of the literature and then a critique of the literature. Many of the studies include in this literature review examined multiple variables and thus a study may be referenced in more than one section. An in-depth description of the methods of a particular study will be discussed only the first time a study is presented.

Comparison of Nursing Homes and Home Healthcare Agencies

Nursing homes and home healthcare agencies share many similarities. They are important components of the long-term care system and provide care to patients who have some degree of disability and therefore cannot fully care for themselves (Pratt, 2010). They share a unique goal, which is to prevent re-hospitalization of their patients. Hospitalization increases the risk of adverse outcomes for patients who have functional limitations and/or co-morbidities and a change in setting can be distressing for nursing home and home healthcare patients, particularly those who are elderly or cognitively limited (Smith, Lapane, Fennell, Miller, & Mor, (2008). In addition, care for patients of both types of agencies is mainly provided by nursing staff, including registered nurses (RNs), licensed practical nurses (LPNs), and nurses' aides (NAs). Also, each is influenced by the market and community in which they are located, rely principally on Medicare and Medicaid for payment, and are heavily regulated at the national, state, and local levels (Kaye et al., 2010; Pratt, 2010). As well, Medicare and/or Medicaid certified nursing homes and home healthcare agencies are mandated to report a specific set of quality improvement measures to the CMS, with a subset of the data on these measures—for both types of agencies—available to the public via Nursing Home Compare or Home Health Compare

(Mor, 2005). Finally, nursing home studies and home healthcare agency studies that have examined predictors of quality also have relied extensively on publicly available quality improvement measures.

Nursing homes and home healthcare agencies, however, do have important differences that limit the usefulness of the nursing home disparities literature as a guide for the proposed study. Nursing home care is categorized as institutional care because the care is provided in a facility, around the clock (Fennell et al., 2000). In contrast, home healthcare is considered to be non-institutional because care is provided in the patient's home (Pratt, 2010). Thus, for nursing homes, the outcomes of care tend to be more directly related to the care provided in the facility whereas for home healthcare agencies, there are numerous other influences on outcomes (Mor, 2005; Pratt, 2010). For example, in a nursing home a patient is given (in theory) the correct dosage of their medication at the correct time. In the home, it is the patient's responsibility to take the right dosage of medication at the right time (or the caretaker's responsibility to give the patient the right dosage of the medication at the right time). In addition, patients living in nursing homes tend to have more functional disabilities and co-morbidities compared to home healthcare patients (Pratt, 2010). Therefore, the level of care and costs associated with providing this care are likely higher in nursing homes compared to home healthcare agencies. Finally, although Medicare and Medicaid pay for both nursing home and home healthcare services, there are considerable limitations as to what Medicare pays for in terms of nursing home care. In contrast, Medicare pays for a broad range of home healthcare services. Medicaid generally provides full coverage for nursing home care and home healthcare (Pratt, 2010). The result is that compared to home healthcare agencies, nursing homes are much more likely to be heavily dependent on either Medicaid or private pay for their financing whereas home healthcare agencies are more balanced,

though this is shifting and Medicaid is expected to become the largest payer of home healthcare services in the next decade (NAHC, 2010).

The nursing home disparities and quality of care literature has served as an appropriate guide for this study, despite the limitations noted above. There is no existing research on underlying causes of disparities and nursing homes are the most similar healthcare organizations to home healthcare agencies in terms of patient population served, services provided, regulations, workforce, financing, and goals (Pratt, 2010). In addition, research on underlying factors that might be related to disparities *between*, rather than within, healthcare organizations is more advanced in the nursing home setting than in any other healthcare setting. The focus of this study was *between-facility* racial disparities given the number of studies that have indicated African American and White patients receive care from different nursing homes (Konetzka & Werner, 2009). Such a distinction is important because it affects the type of interventions that are recommended. Finally, there are publicly available uniform measures of quality for both nursing homes and home healthcare agencies and all Medicare and/or Medicaid certified nursing homes and home healthcare agencies are required to report on these quality measures (Mor, 2005). The data for the quality measures for both Home Health Compare and Nursing Home Compare are gathered from mandatory patient assessment systems in both home healthcare agencies and nursing homes (Mor, 2005). The patient assessments in home healthcare agencies and nursing homes are completed by RNs (or other licensed professionals such as physical therapists) at the time of admission, at specific intervals thereafter, and then again at discharge (Mor, 2005). Both the Home Health Compare and Nursing Home Compare quality measures include outcome measures that are focused on bladder control, pain, and mobility, though the Home Health Compare measures are focused on improvement (i.e., less pain, improved bladder control)

whereas the Nursing Home Compare measures are not (CMS, 2010a; CMS, 2010b). Therefore, though the specific outcome measures used for home healthcare agencies and nursing homes are different, the types of outcome measures used and the way in which the data are collected are similar (these statements refer to the way data were collected in 2010 and 2011, the years for which data were used for this study).

Factors that Contribute to Disparities in Care

Market Characteristics

Market competition. The relationship between competition and quality of care has been studied often in nursing homes, though rarely as the main purpose of a study. This was true of the studies found and included in this section of the literature review. The main purpose of all of the studies was to examine the relationship between quality of care and other variables such as Medicaid payment rates. However, in all of the studies included here, competition was included as an independent variable and cited for its importance in possibly influencing quality of care.

In the nursing home sector, Grabowski, Angelelli, and Mor (2004) explored the relationship between Medicaid payment rates and three quality measures: inadequate pain management, "high-risk" pressure ulcer prevalence (i.e., percentage of "high-risk" residents with pressure ulcers on the most recent Minimum Data Set assessment), and restraint use not justified by a physician's order. Independent variables included: Medicaid per diem rate, case-mix payment, ownership status, number of beds, wage index, per capita income, and Herfindahl index (a measure of market competition). Data from the Minimum Data Set (MDS); Online Survey, Certification, and Reporting (OSCAR) survey; Area Resource File (ARF); CMS Hospital Wage Index; and State Book on Long Term Care Program and Market Characteristics—all from the years 1998 and 1999—were used for this study. The unit of analysis for the study was the nursing home. A sample of 15,128 free-standing nursing homes was obtained from

OSCAR. Nursing homes that were not Medicare- and/or Medicaid-certified and did not have at least 10 cases in the denominator for a specific quality measure were excluded from the analysis, leaving a sample size ranging from 13,169 to 13,859 nursing homes depending on the quality measure. Using linear regression, the authors found that nursing homes located in less competitive markets had a statistically significant increase in reports of inadequate pain management and statistically significant lower rates of high-risk pressure ulcers (rates of physical restraint use were higher in less competitive markets, but this was not statistically significant).

In another study, Grabowski and Angelelli (2004) used the same data discussed in the previous study to examine the effect of Medicaid reimbursement rates on quality of care, this time measured as risk-adjusted pressure ulcer incidence (i.e., residents without a pressure ulcer at baseline assessment developed a pressure ulcer or those with a pressure ulcer at baseline experienced a worsening of the pressure ulcer) in nursing homes. The sample for this study was 13,736 nursing homes. In this study, the authors examined nursing homes in general and also stratified nursing homes by the percent of Medicaid residents served ("High" Medicaid nursing homes were defined as those nursing homes with greater than 80% Medicaid residents and fewer than 8% Medicare or private pay residents). Multivariate regression was used to indicate that nursing homes located in less competitive markets had a statistically significant lower rate of pressure ulcers; the same findings were observed for nursing homes determined to be "high Medicaid."

Intrator et al. (2007) investigated the relationship between Medicaid payment policies and hospitalization rates of nursing home residents. Hospitalization is expensive and it puts nursing home residents at an increased risk for infection, other serious illnesses, and psychological harm

(Intrator et al., 2007). In addition to Medicaid policies, facility and market factors are thought to be associated with hospitalization of nursing home residents. In this prospective cohort study, the authors examined the effect of 10 variables (nursing home size, ownership status, chain status, percent Medicare residents, percent Medicaid residents, percent "other payer" residents, occupancy rates, RNs and total number of nurses [RNs, LPNs, and NAs], Herfindahl index, and per capita income). The outcome variable was defined as hospitalization within 150 days of an initial baseline assessment. Nursing home residents who were not hospitalized within 150 days of admission were separated into two groups: those who died in the nursing home within 150 days and those who survived to at least 151 days. Data from the MDS, OSCAR survey annual report, ARF, CMS Medicare eligibility files, and the survey of state nursing home policies—all from the year 2000—were used in this study. Included in the sample for the study were 510,614 nursing home residents from 8997 urban, free-standing nursing homes, all obtained from the MDS. Nursing homes from rural markets and those with fewer than 20 beds were excluded from the study. Using multilevel models to account for residents being nested in nursing homes, nursing homes nested in markets, and markets nested in states, the authors found that residents of nursing homes located in more highly competitive markets had statistically significantly higher odds of being hospitalized and statistically significantly lower odds of dying in the nursing home.

Last, Li and colleagues (2011) examined the trend of racial disparities in pressure ulcer prevalence over time and assessed if these disparities were related to where nursing home patients received their care. The authors categorized nursing homes according to their proportions of Black residents ("High" was defined as greater than 35% Black nursing home residents and "Low" was defined as less than 5% Black residents). Data from 2003–2008 from

the MDS, OSCAR survey, and ARF were used for this study. The sample of 2.1 million White and 346,808 Black nursing home residents from 12,473 Medicare- and/or Medicaid-certified nursing homes was obtained from the MDS. The primary outcome measure for this study was whether or not the patient had a stage 2 or higher pressure ulcer reported each year. Independent variables were: total number of beds, profit status, chain status, percent Medicaid residents, percent population over the age of 65, Herfindahl index, and location. Using the generalized estimating equations approach, the authors examined the overall rate of disparities in pressure ulcer prevalence, the rate of pressure ulcer prevalence *within* nursing homes, and the rate of pressure ulcer prevalence *between* nursing homes. Li and colleagues (2011) found that over half of the disparity in pressure ulcer prevalence between black and white patients was *between* rather than within sites. Although this study did not examine a direct link between market competition and quality of care for nursing home residents in "High," "Medium," and "Low" and nursing homes, the findings indicate that compared to "Low" nursing homes, "High" nursing homes were more likely to be located in less competitive markets, measured by the Herfindahl index, and these nursing homes also had a higher rate of government issued deficiency citations—both the total number and those related specifically to quality of care. These findings suggest that there could be a link between market competition and quality of care for patients residing in nursing homes with a high percentage of Black residents.

In summary, the studies reported above suggest that home healthcare agencies and nursing homes are sensitive to the market in which they are located. Whether being located in a highly competitive market has a positive effect on quality of care is unclear. In addition, the study by Li and colleagues (2011) does provide some initial indications that there might be a positive relationship between competition and quality of care (i.e., higher competition is

associated with higher quality of care) for "high minority-serving" healthcare organizations. Further study is needed to determine if such a relationship does exist.

Community Characteristics

African American population. Residential racial segregation affects all aspects of a community, from quality of schools to resources that are available to residents and businesses. In turn, these community factors can affect the quality of all types of health care provided to African American patients (Williams & Collins, 2001; Smedley et al., 2003). Communities that have a high degree of residential racial segregation (i.e., those with a dissimilarity index of 0.60 or greater, meaning that 60% of African Americans would have to move to eliminate segregation) (Williams & Collins, 2001) tend to have fewer businesses that provide medical equipment and other supplies, making it difficult for home healthcare staff (or patients) to secure necessary equipment and supplies (Olson, 2010). Thus, communities that are characterized by a high percentage of African American residents might have fewer resources that are available to their home healthcare agencies, which could affect whether or not a home healthcare agency has the capacity to improve quality of care for its patients (Mor et al., 2004; Miller et al., 2006; Konetzka & Werner, 2009).

In a paper that described plans for a future study to examine the relationship between racial disparities in quality of care, nursing home structures and processes, and community context, Fennell and colleagues (2000), using contingency theory as a guide, hypothesized that nursing homes located in more racially segregated communities would be characterized by lower quality of care. In a follow-up study testing their hypotheses drawn from contingency theory, Miller and colleagues (2006) examined the relationship between nursing home and county racial mix on quality of care in nursing homes. The sample for this observational study was 408 urban Medicare- and/or Medicaid-certified New York nursing homes. Rural nursing homes were

excluded from the analysis because of the small sample sizes for the variables of interest. The authors used 1995 data from the MDS, the OSCAR survey, and the ARF. Outcome measures for the study were prevalence of physical restraints and prevalence of antipsychotic drugs. Independent variables used for the study were percent Medicaid residents in nursing home, percent Medicare residents in nursing homes, nurses (full-time [FTE] RNs and LPNs) per 100 beds in nursing home, proportion African American residents in nursing home, county nursing home occupancy, county percent below poverty, and proportion of African American county residents.

Because the authors wanted to examine the effect of proportion of African American nursing home patients on nursing home quality measures for both White and African American patients, separate regression models were run for non-Hispanic White patients and African American patients. The authors found that compared to non-Hispanic White patients, African American patients had a 32% lower likelihood of being physically restrained in nursing homes with a higher percentage of African American patients (nursing homes with 10.1% African American patients compared to nursing homes with 2.4% African American patients). However, they found that when the percent of African Americans in the county was included in the model, the likelihood of African American patients being physically restrained, compared to White patients, decreased to 29%. The results for non-Hispanic White nursing home patients residing in nursing homes with a higher percentage of African American patients were similar.

These findings for both African American and White patients residing in nursing homes with a high percentage of African American residents suggest that there is a negative relationship between county percent African American population and physical restraint use in nursing homes (i.e., as the percent of African American county residents increases, the likelihood of

being restrained increases). Another finding from the study was that residents (both African American and non-Hispanic Whites) of for-profit nursing homes located in more racially segregated counties (regardless of nursing home percent African American residents) had a higher likelihood of receiving an antipsychotic drug compared to residents of for-profit nursing homes located in less racially segregated counties. The authors concluded that it is important for researchers to consider the context in which care is provided, both at the facility level and county level.

Per capita income, county unemployment rate, and county poverty level. *High AA NHs*, compared to *Low AA NHs*, are more likely to be located in counties characterized by a lower per capita income, limited employment opportunities, and a higher proportion of residents living in poverty (Howard et al., 2002; Mor et al., 2004; Miller et al., 2006). However, the relationship between these factors and quality of care has not been firmly established.

Per capita income. Brega and colleagues (2003) examined the relationship between a variety of factors, including per capita income, and five measures of home healthcare practice patterns that could influence patient outcomes. Using the 1995 OSCAR survey, all Medicare-certified home healthcare agencies from the lower 48 states of the United States were categorized based on volume (where volume was defined as the average number of visits per Medicare beneficiary receiving home health care). A total of 44 home healthcare agencies were selected from four "high-volume" states and four "low-volume" states. Fifty-nine percent of the home healthcare agencies include in the sample were located in the four low-volume states and the other 41% of home healthcare agencies were located in the four high-volume states. Data on the home healthcare patients included in the study were collected from these home healthcare agencies. The unit of analysis for the study was the episode level (an episode is defined as the

time period from the patient's start of care visit to the patient's discharge visit) and there were a total of 684 patients with 732 episodes of care included in the final sample for the study. Data from the OASIS and the Care Provider Questionnaire from November 1998–August 2000 were used for this study. The variables used to measure home healthcare practice patterns were: number of visits per day, episode length (i.e., time from admission to discharge), number of disciplines involved in care (i.e., RN, speech therapist, physical therapist), number of community/alternative services coordinated, and the amount of feedback provided to the care provider (by other agency personnel) conducting a patient's start of care visit. Using ordinary least squares regression, the authors found that home healthcare agencies located in counties with higher per capita income had shorter episodes of care (i.e., time from admission to discharge) and less communication between care providers on the care coordination team. The relationship between length of stay (i.e., time from admission to discharge) for home healthcare patients and quality of care is unclear, though a recent study found no relationship between home health care length of stay and outcomes of home health care (Grabowski, Huskamp, Stevenson, and Keating, 2009).

In another study of home healthcare agencies, Vanderboom and Madigan (2007) examined whether the degree of rurality of a home healthcare agency influences patient outcomes. The authors identified states with a significant rural population (where rurality was measured using the Rural-Urban Continuum Codes [RUCC] created by the Economic Research Service, a division of the U.S. Department of Agriculture) and then randomly selected home healthcare agencies beginning with the most rural state (those states with the greatest number of counties defined as "rural", codes 8 and 9 based on the RUCC codes) and progressing to less rural states until the necessary sample size was reached. The final sample size of 241 home

healthcare agencies was divided into four groups based on degree of rurality with approximately equal numbers of home healthcare agencies in each group. Data from Home Health Compare, Medicare Home Healthcare Cost Reports, and the U.S. Census Bureau were used for the study. Outcome measures for the study were total number of visits per patient and hospitalization rates for the home healthcare agencies. Independent variables included in the study were rurality, for-profit ownership, hospital operated, agency size, years certified as home healthcare agency, and county per capita income. Using path analysis and multiple linear regression, the authors found that home healthcare agencies located in counties with a lower per capita income, regardless of degree of rurality, had higher rates of hospitalization compared to those agencies located in counties with a higher per capita income.

Grabowski, Angelelli, and Mor (2004) found that nursing homes located in counties with higher per capita income had higher rates of inadequate pain management and pressure ulcer prevalence but lower rates of physical restraint use. In a separate study using the same data, Grabowski and Angelelli (2004) found that nursing homes located in counties with a higher per capita income had higher rates of pressure ulcer incidence.

County unemployment rate. In a search of the nursing home and home healthcare agency literature one study on nursing home quality of care was found that included county unemployment rate. In this study, Castle, Engberg, and Men (2008) examined the association between the use of nurse aide agency staff and quality of care in nursing homes. The authors included organizational and market characteristics in the study because these characteristics were conceptualized as having an effect of nursing home staffing and quality of care in nursing homes. The study used data from a 2005 survey of nursing home administrators, Nursing Home Compare–2004, OSCAR survey–2004, and the ARF–2004. The nursing home administrator

survey was sent to approximately 4000 nursing home administrators and had a response rate of 74%, yielding a sample size of 2840 surveys. Outcome measures included in the study were the 14 quality measures available for download on Nursing Home Compare. Independent variables were occupancy rates; ownership status; chain status; size; RN, LPN, and NA staffing levels; NA agency staffing levels; Medicaid occupancy (percent Medicaid residents); Herfindahl index; and county unemployment rate. Using linear regression, the authors found that a higher county unemployment rate was associated with a statistically significant decrease in quality in 10 of the 14 quality measures. They found a non-statistically significant decrease in quality for three other quality measures and a non-statistically significant decrease in the use of physical restraints for nursing homes located in counties with higher unemployment rates. The authors concluded that the association between unemployment rate and quality suggests that these nursing homes are located in poorer areas and likely have fewer resources available to use for improving quality of care.

County poverty level. Miller and colleagues (2006) included county poverty level in their study. They found that non-Hispanic White residents of nursing homes located in counties with a higher poverty level had a statistically significant lower likelihood of physical restraint use compared to non-Hispanic White nursing home patients residing in nursing homes located in counties with a lower poverty level. In contrast to this, they found that non-Hispanic White and African American residents of nursing homes located in counties with a higher poverty level had an increased, though not statistically significant, likelihood of antipsychotic restraint use compared to non-Hispanic White and African American residents of nursing homes located in counties with a lower poverty level.

Although the results of studies examining the relationship between per capita income, unemployment rate, and poverty level and quality of care in home healthcare agencies and nursing homes are mixed, there is clearly a relationship that needs further exploration. Communities with low income levels, high rates of unemployment, and high rates of poverty are often characterized by a lack of other medical facilities and healthcare organizations (Olson, 2010). This makes linkages between healthcare organizations difficult and possibly contributes to poor coordination of care, a crucial component of quality home health care. If *High AA HHAs* are located in similar communities, there are likely fewer resources available that enable home healthcare staff to provide care that is often essential to help home health patients achieve the level of independence that is needed to continue to live in their homes (Mor et al., 2004; Olson, 2010).

Location and census region.

Location. The relationship between location (i.e., rural or urban) and quality of care has been investigated in both home healthcare agencies and nursing homes. Vanderboom and Madigan (2007) investigated the relationship between degree of rurality and hospitalization rates. They found that rates of hospitalization are not directly related to degree of rurality but rather that rurality acts indirectly, through the availability of healthcare services. For example, compared to urban home healthcare agencies, rural home healthcare agencies are more likely to be low income and these home healthcare agencies might have a more difficult time obtaining professionals to meet the needs of their patient population. Thus, home healthcare patients of more rural agencies might be more likely to be hospitalized for something that could have been prevented had appropriately trained staff been available for the patient.

Li et al. (2011) found that nursing homes with a higher percentage of African American residents were more likely to be urban and that these nursing homes had an increased number of government-issued deficiency citations—both total and those specifically related to health care.

Census region. In a study of home healthcare agencies, Jung and colleagues (2010) examined the relationship between agency characteristics and changes in quality improvement over time after Home Health Compare was implemented. The study used data from Home Health Compare and the Provider of Services files from 2003 to 2007. Included in the study were 9,470 unique Medicare- and/or Medicaid-certified home healthcare agencies. The unit of analysis was the agency-year and the total number of observations for the study was 29,347 agency-years. Outcome measures included in the study were the seven outcome measures that have been reported on Home Health Compare every year since 2003: improvement in bathing, transferring to bed, managing oral medications, having less pain, improvement in walking, emergent care use, and hospitalization. Independent variables were: ownership status, hospital based, branch affiliation, number of FTE RNs (used to measure agency size), years Medicare/Medicaid-certified, and census region (South, Northeast, Midwest, West).

Using linear regression, the authors found that compared to home healthcare agencies in the South, home healthcare agencies in the West showed significant improvement in all measures (four—bathing, managing medications, emergent care use, and hospitalizations—were statistically significant); home healthcare agencies in the Midwest showed improvement in five out of seven measures (two—pain and hospitalization—were statistically significant) and a decline (not statistically significant) in the other two measures (walking and bathing); and home healthcare agencies in the Northeast showed improvement in three out of the seven measures

(one—pain—was statistically significant) and a decline in the other four (two—bathing and emergent care use—were statistically significant).

In summary, the results of the review of the literature for location and census region indicate that these two variables might be related to quality of care; however, the direction of relationship is unclear. In addition, there is variation in quality of care across regions of the country. It is unclear if these two variables directly affect quality of care or if the relationship is indirect. Regardless, highly urban communities are often characterized by a high rate of crime and decaying facilities for their residents (Williams & Collins, 2001; Olson, 2010). In addition, highly urban communities often have a concentrated African American populations with many of the most urban U.S. inner cities characterized by a high degree of residential racial segregation and poverty (Smith et al., 2007). Highly rural communities are often extremely poor and have fewer resources when compared to slightly less rural communities (Mor et al., 2004). Home healthcare agencies located in highly rural communities likely face challenges in providing an adequate number of services to higher-need patients, possibly resulting in poorer quality of care and poorer outcomes for their patients (Vanderboom & Madigan, 2007). *High AA HHAs* that are located predominantly in highly rural or highly urban communities, depending on income level of the community, will likely find it difficult to coordinate care with primary care providers and needed health-related resources might not be readily available (Olson, 2010). Such difficulties could result in poor quality of care being provided to patients of these home healthcare agencies.

Education level. Community education level (i.e., a low percentage of the population with a high school or higher level of education) has not been included in the nursing home disparities research, though poor communities are often characterized by a lower level of education (Fennell et al., 2000). Based on contingency theory, Fennell and colleagues (2000)

hypothesized that communities with a higher level of education would have nursing homes with higher quality of care because the nursing homes would be drawing staff from their communities. In addition, they thought that a more highly educated community would be more likely to investigate quality of care in local nursing homes, using tools such as the CMS's Nursing Home Compare, and press nursing homes to improve their quality of care. If *High AA HHAs* are located in communities with a low level of education, that might be an indication that there are few educational resources for both the nursing staff and community. For example, community colleges are important providers of initial nursing education (e.g., associate degree for potential RNs) and continuing education to nursing staff in the community and there might not be community colleges in these communities for residents and home healthcare agency staff to attend. Thus, county residents could have lower access to post-secondary education and home healthcare agency nursing staff might not have opportunities to gain continuing education or specialty certification such as gerontology, pain management, or wound/ostomy care. Without these educational resources, home healthcare agencies might find it difficult to find enough qualified nursing staff to hire and to provide high-quality care to patients.

Organizational Characteristics

Ownership status. Over two-thirds of nursing homes and the majority of home healthcare agencies are for-profit (Hillmer, Wodchis, Gill, Anderson, & Rochon, 2005; Grabowski et al., 2009). The relationship between ownership status and quality of care in home healthcare agencies has been investigated, with several studies available for review. In addition, there is one study of *High* and *Low AA NHs* that examined the association between profit status and quality of care.

In the home healthcare sector, Brega et al. (2003) found that for-profit home healthcare agencies provided a higher number of visits per day, employed a larger number of

alternative/community services, and had an increased amount of feedback among care providers on the care coordination team. The authors also found that episode lengths (i.e., time from admission to discharge) were shorter in for-profit home healthcare agencies compared to non-profit home healthcare agencies. Jung et al. (2010) found that government-owned home healthcare agencies had poorer performance on quality measures and less improvement over time when compared to for-profit home healthcare agencies. Non-profit home healthcare agencies showed greater improvement in quality over time when compared to for-profit home healthcare agencies. Finally, Miller et al. (2006) found that for all nursing homes patients, regardless of the racial makeup of the nursing home (i.e., percent African American nursing home residents), residence in a for-profit nursing home was associated with a higher likelihood of being physically restrained and a higher likelihood of receiving antipsychotic medications.

In a study of home healthcare agencies, Smith and colleagues (2008) evaluated the association of home healthcare agency profit orientation with quality of care. The authors used data from the 2000 National Home and Hospice Care Survey and had a sample size of 1,034 home healthcare agencies. Quality of care was measured as patient risk for hospitalization within 60 days of admission to the home healthcare agency. Independent variables used in the study were: profit status (for-profit and non-profit), patient demographics, measures of patient comorbidities, functional status, aids used, presence of urinary catheter or colostomy, referral source for home health care, payer source, chain status, size, census region, and location (urban and rural). In their bivariate analyses, the authors found few differences between patients of for-profit and non-profit home healthcare agencies. However, they did find that patients of for-profit home healthcare agencies were more likely to have Medicaid and less likely to have Medicare as their primary payer. Using multiple logistic regression, the authors did not find support for their

hypothesis that patients of for-profit home healthcare agencies would have a higher risk of hospitalization. However, they did note that a significant limitation of the study was the small sample size relative to the potential confounders that need to be considered.

O'Neil, Harrington, Kitchener, and Saliba (2003) investigated the relationship between profit levels and nursing home quality of care in for-profit and non-profit nursing homes. In this study, the authors used data on 1,098 free-standing California nursing homes; hospital-based nursing homes were excluded from the sample. Data from the California Office of Statewide Planning and Development, the OSCAR survey, and California licensing and statistical reports—all from the years 1998 and 1999—were used for the study. Quality of care was measured as total deficiencies (citations issued by state survey agencies) and total F+ deficiency citations. Citations are graded from "A" to "L" and citations with a grade of "F" or higher (i.e., "G", "H") are those that have the potential to or actually do cause harm to residents. Independent variables included in the study were: demographic characteristics, ownership status, chain status, size (number of beds), occupancy rates, location in the Los Angeles or San Francisco Bay area, Herfindahl index, percent Medicare resident days, percent Medicaid resident days, profit level, liquidity, and solvency in 1998.

Descriptive statistics showed that, compared to non-profit nursing homes, for-profit nursing homes were more likely to have a higher percentage of Medicare and Medicaid residents, be larger, and have a higher percentage of African American and Hispanic residents. Using tobit multivariate analyses, the authors found that among for-profit nursing homes, those with the highest profit had significantly more total and "F+" deficiencies than for-profit nursing homes with lower levels of profits. The same relationship was not seen in non-profit nursing homes. The authors concluded that non-profit nursing homes serve a more lucrative market due

to their higher percentage of private-pay residents and that non-profit nursing homes reinvest their profits in the nursing home rather than redistribute profits to shareholders as for-profit nursing homes must do. The authors also noted that for-profit facilities have fewer opportunities to raise rates and increase revenue and therefore it is more difficult to improve quality of care in for-profit nursing homes.

The literature reviewed indicates that for-profit home healthcare agencies and nursing homes are more likely than non-profit home healthcare agencies and nursing homes to provide poorer quality of care, but the relationship between ownership status and quality is not firm. It has been suggested that for-profit organizations place more emphasis on increasing financial returns as opposed to improving quality of care while non-profit organizations reinvest profits (O'Neil et al., 2003; Hillmer et al., 2005; Popescu et al., 2009). For-profits are in a position where they have to satisfy investors with profits and might not be able to quickly raise revenue (given low Medicaid reimbursement rates). Thus, for profit *High AA HHAs* might have a more difficult time raising revenue and improving quality of care when compared to *Low AA HHAs*.

Size. The relationship between organizational size and quality of care has been examined in both home healthcare agencies and nursing homes. In a study of home healthcare agencies, Jung et al. (2010) used the total number of RNs as a proxy for home healthcare agency size, though this is potentially problematic because it confounds agency size and staffing levels. In their study, the authors found a positive association between the number of RNs and quality for five out of the seven quality measures examined. In numerous studies from the nursing home literature size was associated with quality of care. Grabowski and Angelelli (2004) found an increase in size (measured as number of beds) was associated with an increase in pressure ulcer incidence. In another study, Grabowski, Angelelli, and Mor (2004) found an increase in size

(measured as number of beds) was associated with a decrease in reports of pain and an increase in both pressure ulcer prevalence and the use of physical restraints. Finally, Li et al. (2011) found that nursing homes with a higher percentage of African American patients were more likely to be larger (measured as number of beds) and that *High AA NHs* had higher numbers of total deficiency citations and deficiency citations related specifically to health care compared to nursing homes with a lower percentage of African American patients.

In a longitudinal study of 14,042 Medicare- and/or Medicaid-certified nursing homes, Castle (2002) examined characteristics of nursing homes associated with poor quality of care as evidenced by the improper use of physical restraints. Data from the OSCAR survey from 1996, 1997, and 1998 were used in this study. The outcome measures were a deficiency citation for physical restraint use on any survey inspection, deficiency citations for physical restraint use on two consecutive inspections, and deficiency citations for use of physical restraints on three consecutive inspections. Independent variables included in the analysis were: size (measured as number of beds), occupancy rate, ownership status, chain status, staffing levels—nurses (RN, LPN, NA) per 100 beds, and number of Medicaid residents. Castle (2000) categorized nursing homes as into quartiles based on number of Medicaid patients (i.e., the fourth quartile had the highest Medicaid census). Using logistic regression, Castle (2002) found that compared to smaller nursing homes (measured as number of beds), larger nursing homes were more likely to have at least one deficiency citation. Castle (2002) also found that larger nursing homes with a higher Medicaid census had increased odds of one or more deficiency citations.

Lapane and Hughes (2004) evaluated the relationship between organizational characteristics and management of depression using antidepressants in nursing homes. The authors used data from the MDS and OSCAR survey from the year 2000. The sample size for the

study was 2,128 nursing homes randomly sampled from six states. The main outcome measure was whether or not antidepressants were used to treat identified depression in nursing home residents (though the authors considered the use of tricyclic antidepressants [TCAs] to be an indicator of poor management of depression because of the side effects—memory impairment, urinary retention, constipation, dry mouth, glaucoma, and cardiac abnormalities—associated with the use of tricyclic antidepressants for elderly people). Independent variables included in the study were: size, ownership status, occupancy rate, percent Medicaid residents, percent Medicare residents, percent other pay residents, and nurse staffing levels (RNs, LPNs, and NAs per 100 beds), NA to RN ratio. Using generalized estimating equations, the authors found that larger nursing homes (measured by number of beds) were less likely to treat depression compared to smaller nursing homes.

Finally, Castle and Engberg (2007) also examined the influence of staffing levels, turnover, worker stability, and agency staff use in quality of care in nursing homes. The authors stratified nursing homes by rates of turnover and randomly selected two states from the highest tercile of turnover and two states from the lowest tercile of turnover. A random sample of 40% of facilities from each state was selected for inclusion in the study. Surveys were mailed to nursing home administrators from the random sample. With a response rate of 70%, the sample for this study was 1,071 nursing homes. The authors linked the survey data to data from Nursing Home Compare from 2003, OSCAR from 2004, and the ARF from 2005. The outcome measures for this study were 14 quality measures from Nursing Home Compare that were combined to form a single index of quality. Independent variables were: staffing levels, turnover rates, stability rates, and agency use rates for RNs, LPNs, and NAs; size (number of beds); chain status; ownership status; occupancy rates; percent Medicaid residents; Herfindahl index; and unemployment rate.

Using multiple regression, Castle and Engberg (2007) found that larger nursing homes (measured by the number of beds) were associated with poorer quality of care.

Organizational size is an important variable to consider. The nursing home literature largely supports the hypothesis that larger size is related to poorer quality of care. It is possible that contrary to the nursing home literature, larger home healthcare agencies might be able to provide higher quality of care to their patients because they might be able to hire more professional staff (i.e., speech therapists, medical social workers) that can provide varied services that patients need. However, this same logic may not hold for *High AA HHAs,* which are likely characterized as resource poor and might not be able to hire additional staff.

Agency age. Agency age and its association with quality of care have been examined in several studies of home healthcare agencies. Brega et al. (2003) found that home healthcare agencies that had been in operation longer were more likely to use a higher number of community/alternative services in their care compared to those in operation for a shorter period of time. Vanderboom and Madigan (2007) did not find a relationship between the number of years the agency was Medicare- and/or Medicaid-certified and risk of hospitalization. Finally, Jung and colleagues (2010) found that older home healthcare agencies (measured as number of years Medicare-certified) that had high quality of care at baseline also showed significant increases in quality over 5 years. It is unknown if *High AA HHAs* are more likely to be younger or older than *Low AA HHAs.* However, nursing homes that serve a high percentage of Medicaid patients (most often *High AA NHs)* are more likely to close than those that serve a low percentage of Medicaid patients (often *Low AA NHs*), suggesting that *High AA NHs* might be younger compared to *Low AA NHs* (Feng et al., 2011). In addition, given the financial challenges likely faced by *High AA HHAs* and the likelihood of being located in markets where achieving

and maintaining financial stability is difficult, it is possible that *High AA HHAs* will be younger compared to *Low AA HHAs* (Baum, 1997). However, they might still be more willing than older, more established agencies to devote limited resources to quality improvement initiatives as a way to establish their own niche and show they are on the cutting-edge, especially given health care's increased focus on quality improvement (Baum, 1997). Therefore, it is unknown how agency age might be related to quality of care in *High AA HHAs.*

Payer mix—Medicare and Medicaid patients. Payer mix and quality of care have been studied frequently in nursing homes. Castle (2002) found that nursing homes with a higher average Medicaid census (percent residents covered under Medicaid) were more likely to have at least one deficiency citation. Lapane and Hughes (2004) found that nursing homes with a lower Medicaid census were more likely to use antidepressants to treat identified depression compared to those with a higher Medicaid census. Castle and Engberg (2007) found a statistically significant negative relationship between Medicaid census and quality of care. Castle and colleagues (2008) also found a strong negative association between Medicaid census and quality of care (13 out of 14 quality measures). Finally, Li et al. (2011) found that compared to nursing homes with a lower percentage of African American patients, nursing homes with a higher percentage of African American residents were more likely to have a higher percentage of Medicaid residents and these same nursing homes had higher prevalence of pressure ulcers and increased numbers of total deficiency citations and deficiency citations related specifically to health care.

Mor and colleagues (2004) examined the characteristics of Medicaid-dependent nursing homes, their clientele, and the quality of care they provided. This observational study included 14,130 free-standing Medicare- and/or Medicaid-certified nursing homes; hospital-based nursing

homes were excluded from the sample. The authors used data from the OSCAR survey, MDS, and the ARF—all from the year 2000. Nursing homes were stratified based on their percent of Medicaid residents; nursing homes with greater than 85% Medicaid, less than 10% private pay, and less than 8% Medicare residents were considered to be "low tier." The authors further stratified nursing homes by ownership status—for-profit and non-profit. They compared for-profit lower tier to for-profit higher tier nursing homes and did the same for non-profit nursing homes. Independent variables included in the analysis were: number of FTE administrators; number of FTE RNs, LPNs, and NAs; number of cited deficiencies; occupancy rate; facility residents by race; ownership status; chain status; per capita income. Chi-square tests showed that lower-tier facilities had significantly fewer RNs, lower occupancy rates, more total deficiency citations and more deficiency citations specifically related to health care, higher rates of pressure ulcer incidence, higher use of physical restraints, and higher use of chemical restraints (antipsychotics used as restraints). The authors also found that African American nursing home residents were 40% more likely to reside in a lower-tier facility as compared to White nursing home residents.

The nursing home literature is clear that there is a negative relationship between Medicaid census and quality of care. This relationship has been found between nursing homes in general and also specifically between *High AA* and *Low AA NHs*. If *High AA HHAs* are similarly characterized and have resource constraints typical of *High AA NHs*, then they might be unable to provide the necessary level of care and thus quality of care may be poorer at these agencies. In addition, in the age of public reporting of quality measures, consumers—most often those covered by private insurance and/or Medicare—are able to avoid home health agencies that provide poor quality of care, thus further depriving these agencies of needed resources and a

more balanced mix of patients (Goldman, Vittinghoff, & Dudley, 2007; Konetzka & Werner, 2009).

Profit margin. Very few studies have examined the relationship between profit margin and quality of care. No studies of home healthcare agencies were found and only two were found in a search of the available nursing home literature. Profits represent the difference between the revenue that a home healthcare agency generates and the cost of providing care to its patients (O'Neil et al., 2003). O'Neil and colleagues (2003) found that for-profit nursing homes with the highest profit margin were significantly more likely to have more total deficiency citations and "F+" citations than nursing homes with a lower profit margin.

In another study Weech-Maldonado, Neff, and Mor (2003) investigated the relationship between financial performance and quality of care in nursing homes. The authors used MDS, OSCAR survey, the Healthcare Investment Analyst Nursing Home Database, and the ARF—all from the year 1996. The sample included 705 nursing homes from five states that were participating in the Healthcare Financing Administration's (HCFA) Multi-State Case-Mix and Quality demonstration (HCFA is now known as the CMS). Nursing homes that reported negative revenues and costs were excluded from the sample because the authors considered these measures to be either positive or zero by definition. In addition, hospital-based nursing homes were excluded from the sample. The outcome measures for the study were: net revenues per resident day, operating profit margin, and total patient care costs/resident day. Independent variables used were seven measures of nursing home quality, divided into structural, process, and outcome measures. Structural measures were: RN staffing mix defined as the ratio of FTE RNs to total nurse staffing FTEs (RNs, LPNs, and NAs). Process measures were: physical restraint prevalence and catheter prevalence. Outcome measures used were: pressure ulcer prevalence,

pressure ulcer incidence, cognitive decline, and mood decline. Using structural equation modeling, the authors found no statistically significant relationship between operating profit margin and the three sets of outcome measures. They did find a statistically significant positive relationship between revenues and profit margin and a statistically significant negative relationship between patient costs and profit margin.

There is little understanding of the relationship between profit margin and quality of care in nursing homes and home healthcare agencies. Home healthcare agencies can use their profits in different ways, including investing in quality improvement, expansion of services, or to distribute to shareholders if it is a for-profit agency (O'Neil et al., 2003). If a home healthcare agency needs to increase costs in an effort to improve quality of care, the home healthcare agency's profit margin will decrease unless revenues are increased as well. To increase its profit margin, a home healthcare agency would need to either a) increase revenue and keep costs at the same level or b) keep revenue static and decrease the costs associated with providing care (O'Neil et al., 2003). It is possible that *High AA HHAs* are unable to increase their profit margins and therefore do not have the funds needed to invest in quality improvement initiatives so quality of care does not improve, leading to differences between *High* and *Low AA HHAs.*

Nurse Staffing Characteristics

Nurse (RN, LPN, NA) staffing levels. In long-term care, nursing staff (RNs, LPNs, NAs) provide the majority of care to patients and few physicians are involved in the actual delivery of care (Stone, 2004; Pratt, 2010). Therefore, adequate numbers of nursing staff are essential for the delivery of high-quality care in both nursing homes and home healthcare agencies (Stone, 2004). No studies on the relationship between nurse staffing levels and quality of care in home healthcare agencies were found in a search of the available literature, but several studies using nursing homes have been reported.

Castle (2002) found that a larger number of RNs, LPNs, and NAs per 100 beds was associated with greater odds of one of more deficiency citations for physical restraint use for all nursing homes. Lapane and Hughes (2004) found that compared to nursing homes with lower numbers of nurse staffing (RN, LPN, and NA), nursing homes with higher numbers of nurse staffing (RN, LPN, and NA) had a greater likelihood of treating identified depression with any type of antidepressants. They also found that higher staffing levels were associated with a slightly greater likelihood of using tricyclic antidepressants (see previous note regarding authors concern about the use of tricyclic antidepressants and elderly patients) to treat identified depression. Castle and Engberg (2007) found that high levels of RNs were associated with statistically significant higher overall quality of care but that higher levels of LPNs were associated with a statistically significant decrease in overall quality of care. No relationship between NA staffing levels and quality of care was identified.

Last, Castle and Anderson (2011) explored the relationship between RN, LPN, and NA staffing levels and turnover and agency use, professional staffing mix, and quality of care in nursing homes. The authors conducted a repeated survey from 2003 to 2007 of a random sample of nursing home administrators to obtain longitudinal data on staffing levels in nursing homes. The survey had a response rate of 66%, yielding a sample size of 3,941 Medicare- and/or Medicaid-certified nursing homes. Nursing homes that were small (fewer than 30 beds) or hospital-based were excluded from the sample. Data from the OSCAR survey, Nursing Home Compare, and the ARF were also used in this study. Outcomes measures included in the study were: physical restraint use, catheter use, pain management, and pressure sores. Independent variables used were: nurse staffing levels (FTE RNs, LPNs, NAs per 100 beds); professional staff mix (ratio of RNs to LPNs plus NAs); RN, LPN, and NA turnover; RN, LPN, and NA

agency staffing; size; ownership status; chain status; percent Medicaid residents; resident case mix; Herfindahl index; and Medicaid reimbursement rate. Using dynamic panel estimation, the authors found that an increase in RN, LPN, and NA staffing levels was associated with statistically significant improvements in quality of care for all outcome measures except catheter use (statistically significant for RNs, but not LPNs and NAs; still showed improvement when RN, LPN, and NA levels were increased).

In summary, the majority of the reviewed studies showed a positive association between nurse staffing levels and quality of care in nursing homes. It is unclear if the same relationship will be found in home healthcare agencies and if stratifying by percent African American might change the relationship between the variables. *High AA NHs* are characterized by low RN staffing levels and poor quality of care (Mor et al., 2004; Miller et al., 2006; Smith et al., 2007). If *High AA HHAs* also have low RN, LPN, and NA staffing levels, they might not be able to provide the appropriate level of care for their patients, leading to differences in quality between *High* and *Low AA HHAs.*

Critique of the Literature

There were a several limitations to the studies included in this review. The first is that every study relied on secondary data with only five of the studies including any primary data. The use of secondary data in research studies is common; the concern with using secondary data is that the data were often collected for a different purpose. Therefore, the data might not be measuring what that the researchers are investigating, leading to a threat to statistical conclusion validity (i.e., an incorrect conclusion about covariation) (Shadish, Cook, & Campbell, 2002). In addition, the majority (n=13; 68%) of the studies used data that were 10 or more years old. The long-term care industry has undergone significant changes over the past several decades,

including changes to its payment systems. In addition, the population of the United States is graying and Whites still make up the majority of older Americans, the current minorities are soon to make up the majority of Americans. Thus, the factors that influenced quality of nursing home and home health care 10 or more years ago may not be the same factors that are influencing quality of long-term care now. There were also only three (16%) studies that were longitudinal in nature, the rest were cross-sectional. Cross-sectional data do not allow researchers to determine whether or not a causal relationship exists between the variables being examined. In addition, data from a cross-sectional study are reflective of only one point in time, whereas data from a longitudinal study allow researchers to identify trends in the data.

The sample was also a concern for some of the studies. Several studies (n=6; 32%) had sample sizes that were under 1,000 nursing homes or home healthcare agencies; the rest of the included studies had samples of greater than 1,000 nursing homes or home healthcare agencies. Smaller sample size can limit the ability to detect significant relationships. However, studies with large sample sizes can be overpowered and detect associations that are not meaningful (Castle, 2008). Therefore, a power analysis demonstrating the appropriateness of the sample size would have been useful. However, none of the studies stated whether or not a power analysis was done to determine adequate sample size. In addition, some (n=8; 42%) of the studies used a sample that was drawn from only a few states. Although limiting the sample to one or a few states can potentially be helpful because there is variation in long-term care context by state (i.e., differential use of Medicaid waivers), using a sample from either one or a few states limits generalizability. Thus, because the data used in these studies are from only one or a few states, a claim that the results from these studies apply to all states cannot be made (Shadish et al., 2002).

One of the other concerns with the studies included in this review is that although they all measured quality of care in either home healthcare agencies or nursing homes, different measures of quality were used. Some of the studies used pressure ulcer prevalence or incidence (n=5; 26%); a few (n=3; 16%) used a combination of different measures (e.g., pressure ulcer prevalence, physical restraint used, pain management); two (n=2; 10%) used physical restraint use; two used total deficiency citations; one used management of depression; three used hospitalization; one used the CMS's Home Health Compare quality indicators; and three used the CMS's Nursing Home Compare quality indicators.

There are two concerns with including studies that used different measures of quality. The first is that because quality is not monolithic, different aspects of quality might relate differently to various factors such as county poverty level, nurse staffing levels, competition, and ownership type. Therefore, a significantly different relationship might exist between a factor such as county poverty level and a quality measure such as physical restraint use compared to the relationship between county poverty level and rates of hospitalization.

The second concern is whether or not all of these studies were actually measuring quality of care. This represents a threat to construct validity, which concerns whether there is a match between the construct being measured (i.e., quality of care) and how the construct is being measured. If there is not a match between the two, then there is no way to state that "A" caused "B" because the researcher might not actually be measuring "B" (Shadish et al., 2002). Some of the measures that were used to assess quality of care in the aforementioned studies may not have been through any type of construct validity testing to determine if they were in fact measuring quality. Both the Nursing Home Compare and Home Health Compare measures have been

through such a process, but it is unclear as to whether other measures have and therefore we do not know if these were truly measuring quality of care.

Finally, none of the included studies examined the relationship between market, community, organizational, and nurse staffing characteristics and quality of care in either high minority–serving (or high African American) home healthcare agencies and only three investigated the relationship between these characteristics and quality of care in high minority–serving (or high African American) nursing homes. Healthcare organizations, including nursing homes, that serve a high percentage of minority and/or African American patients are located in different markets and communities and have different organizational and nurse staffing characteristics compared to those that serve a high percentage of White patients (Jha et al., 2007; Hasnain-Wynia et al., 2007; Hasnain-Wynia et al., 2010; Mor et al., 2004; Miller et al., 2006; Smith et al., 2007). It is not unreasonable to assume that *High AA HHAs* are similarly characterized and these factors (market, community, organizational, and nurse staffing) will have a similar effect on quality of care in *High* and *Low AA HHAs*. Studies are needed to examine which specific market, community, organizational, and nurse staffing characteristics have the most significant impact on *High AA HHAs* quality of care.

Despite all of the noted limitations, the studies included in this review provided evidence of the relationships that may exist between market, community, organizational, and nurse staffing characteristics and quality of care in *High* and *Low AA HHAs.*

Summary

This chapter has provided a review of the available literature on nursing home disparities, nursing homes, and home healthcare agencies that examined the relationship between market, community, organizational, and nurse staffing characteristics and quality of care. The reasons for

relying heavily on the nursing home literature instead of the home healthcare literature were discussed. Then, the literature that provided support for the selection of specific market, community, organizational, and nurse staffing characteristics was described. Finally, a critique of the literature included in the review was presented. The next chapter will address the research methods that were used to achieve the goals of the dissertation study.

CHAPTER 4: RESEARCH METHODS

Introduction

This chapter describes the methods used to achieve the specific aims of the dissertation: 1) to compare patient characteristics in *High* and *Low AA HHAs;* 2) to compare quality of care in *High* and *Low AA HHAs*; 3) assess the relative influence of market, community, organizational, and nurse staffing characteristics on quality of care at *High* and *Low AA HHAs*; and 4) to identify the factors (market, community, organizational, and nurse staffing) that differentiate high- and low-quality *High AA HHAs*. The study design, data sources, measures, and sampling plan will be reviewed. The chapter concludes with a discussion of the analytical plan and identified limitations.

Research Design

The study used a retrospective, non-experimental, descriptive design. The design was retrospective because the provision of home healthcare occurred in the past; it was non-experimental because there was no manipulation of the variables; and it was descriptive because the intent of the study was to describe racial differences (should they be found) in quality of home health care between *High* and *Low AA HHAs* (Brink & Wood, 1998; Shadish et al., 2002). For all aims, the data on the independent variables were collected in the year 2010 and data on the outcome variables were collected in 2011 so that any variation in independent variables occurred before any variation in the outcome variables. However, no conclusions regarding causality can be made because of the non-experimental research design, which lacked random assignment to control and treatment groups (Shadish et al., 2002). Thus, it is possible that any

relationships between the independent variables and outcome measures were due to extraneous variables not included in the model (Brink & Wood, 1998). To reduce this possibility, variable selection was guided by the theory of institutional racism, the conceptual model, the nursing home disparities literature, the nursing home quality of care literature, and the home healthcare quality of care literature. However, there still exists the chance of an alternative explanation so a causal connection cannot be definitively made given the research design (Brink & Wood, 1998; Dowd & Town, 2002; Shadish et al., 2002).

Data Sources

This study used five secondary data sets, all of which are publicly available except for the OASIS data, which the Centers for Medicare and Medicaid Services (CMS) considers to contain identifiable data. A proposal was submitted to and approved by the CMS for use of the OASIS data.

Outcome and Assessment Information Set and Home Health Compare

Outcome and Assessment Information Set. The CMS's Outcome and Assessment Information Set (OASIS) for the calendar year 2010 was the main source of data for this study. The CMS mandates that an OASIS assessment is to be completed on every patient with Medicare and/or Medicaid as the primary payer of home healthcare services at specific times during the receipt of home healthcare services. Because the bulk of formal home healthcare services (65–70%) are paid for by Medicare and/or Medicaid, the majority of home healthcare patients have completed OASIS assessments (NAHC, 2010; Ng et al., 2010).

The OASIS assessments are completed by an RN or other licensed professional (e.g., physical therapist) on admission, every 60 days while the patient is receiving home health care, and then when the patient is discharged home or care is transferred to a hospital or nursing home. The time from admission to discharge is considered by the CMS to be an "episode of care." If a

patient chooses to transfer care to another home healthcare agency or the patient is discharged to a nursing home or hospital and then readmitted to home care, a new episode of care begins (CMS, 2010c). Therefore, any patient could have more than one entry in the OASIS data set if the patient was admitted and discharged from home health care more than once during the calendar year 2010.

The OASIS data files contain basic information on home healthcare agencies (e.g., Medicare provider number, agency name, and location) and a variety of patient characteristics, including demographic data (e.g., gender, race, insurance provider), dates of service, and descriptive information such as the patient's overall health status and current living situation. The OASIS data are organized at the patient level. For this study, the patient-level data were aggregated across episodes of care and up to the agency level (see Data Analysis Plan below).

Home Health Compare. The next source of data was the CMS's Home Health Compare (HHC) database for calendar year 2011, which is publicly available and contains the six quality measures (discussed below under "outcome variables" for aims 2 and 3) that were used as outcome variables for the study. Home Health Compare data are updated quarterly and reflect a rolling 12 months of data. Data for all episodes of care that end within the 12-month period are included, regardless of when the episode of care began (CMS, 2010c). All home healthcare agencies that serve adult, non-maternity Medicare and/or Medicaid patients are required to submit OASIS assessment data in a standardized format (CMS, 2010c). These data are submitted by individual home healthcare agencies to state repositories where there are multiple checks for errors. If errors are identified, the OASIS assessment is returned to the submitting agency and the errors must be fixed. Once verified, the assessment data are submitted to the CMS where they are aggregated to the agency level and posted to the HHC Web site. In addition to the error checks

for each OASIS assessment, the OASIS repository software also checks to make sure that submitted assessments are consistent with previously submitted assessments (for each patient) and that there are no gaps in submissions (e.g., second intake assessment for a patient without a discharge assessment being received) (CMS, 2010c). Finally, state surveyors also examine the accuracy of home healthcare agencies' OASIS submissions (CMS, 2010c).

OASIS and Home Health Compare strengths and limitations. The OASIS contains patient demographic data and numerous other items designed to assess patient health status outcomes and subsequently provide home healthcare agencies with a way to evaluate the quality of care they are providing. Researchers created 41 risk adjusted outcome measures using all 107 OASIS items, except the patient identifiers (Shaughnessy & Hittle, 2002). The Home Health Compare data are derived from the OASIS risk adjusted outcome measures. Thus, the two data sets share strengths and weaknesses.

One of the main strengths of these data sets is that the OASIS is a standardized patient health status assessment tool. It was created for the purpose of measuring patient health status outcomes and for using this information to monitor and assess quality of care provided by home healthcare agencies (Mor, 2005; Sangl, Saliba, Gifford, & Hittle, 2005). In addition, the OASIS outcome measures are derived from a uniform system that was established with the purpose of monitoring quality of care provided by home healthcare agencies (Mor, 2005; Sangl et al., 2005). Thus, the quality of care information that is collected by home healthcare agencies and posted on Home Health Compare is the same for all agencies. Because of the collection mandates for OASIS data by the CMS, quality measures are publicly available from almost all home healthcare agencies across the United States on nearly all of their patients (Mor, 2005). Thus, researchers can compare quality of care information between agencies and at multiple levels.

There are several concerns with the OASIS and Home Health Compare data. The first is with the reliability and validity of the OASIS items and outcome measures. While the reliability and validity of the 41 risk adjusted outcome measures was completed during demonstration trials, there have been no additional tests of the reliability and validity of these specific outcome measures (Hittle et al., 2003; Mor, 2005; Shaughnessy et al., 2002). In addition, there are no studies available that have examined the reliability and validity of the specific set of Home Health Compare measures that were used for this study. There have been several studies that have assessed the reliability and validity of the OASIS items. Researchers have found mixed evidence of the reliability and validity of the OASIS items (Kinatukara, Rosati, & Huang, 2005; Lynn, 1986; Madigan & Fortinsky, 2001; Madigan & Fortinsky, 2004).

Other concerns with the OASIS data are that the OASIS assessments are made by registered nurses or other professional staff members, all of whom have varying levels of experience using the OASIS (Sangl et al., 2005). There are also a number of items, such as depression and pain management, that can be assessed either by direct questioning from the provider or through self-report (Mor, 2005; Sangl et al., 2005). Both of these issues can cause significant variability in reports of stabilization or improvement in these areas. These differences in data collection can lead to problems with the validity of quality measures and thus comparisons of quality between agencies (Mor, 2005).

Finally, there is variability in the age range of patients who are recipients of home health care. Patients in different age ranges can have very different needs and functional abilities, both of which can influence quality of care. In addition, the OASIS and Home Health Compare outcome measures are not broken down by age group and only age of 75 or greater is included as a risk factor in the risk adjustment models (Nuccio, Goodrich, & Hittle 2008). Thus, there is no

way for researchers to identify whether or not outcomes vary by age, which they likely do (Sangl et al., 2005).

The limitations described above present some challenges to researchers interested in using the OASIS and Home Health Compare data. Despite these limitations, the OASIS items and the Home Health Compare measures represent a significant move forward in researchers' ability to examine quality of home health care (Mor, 2005; Sangl et al., 2005). These measures do allow for a comparison of quality of care between home health care agencies, something which has only be done on a limited basis. In addition, by using the quality measures in well designed research studies, researchers can contribute to the improvement of the measures. Therefore, while the limitations of using the Home Health Compare quality measures need to be recognized and addressed, reliability needs to be estimated, and validity of the measures needs to be evaluated, the data should be used to begin to assess quality of home health care.

Provider of Services File and Healthcare Cost Report Information System

Provider of Services file. The third source of data was the CMS's Provider of Services (POS) file for calendar year 2010, which includes data on all Medicare-approved providers. The POS data are gathered from the CMS's Quality Improvement Evaluation System database and are updated quarterly. Variables collected from this file include: ownership status, agency age, and home healthcare agency nurse (RN, LPN) and aide (NA) staffing levels.

Healthcare Cost Report Information System. The fourth source of data was the CMS's Healthcare Cost Report Information System—Home Health Agency (HCRIS-HHA) for calendar year 2010, which extracts data from the Medicare Home Health Agency Cost Report (CMS 1728-94). All Medicare-certified providers that file cost reports are present in the HCRIS if the cost reports have been submitted by the fiscal intermediary and have passed all HCRIS audits. The HCRIS contains accounting information from the balance sheets and income

statements of HHAs filing cost reports. The profit margin was obtained from the HCRIS-HHA. Information for contained in the HCRIS-HHA was collected in the year 2010.

Provider of Services file and Healthcare Cost Report Information System strengths and limitations. These two data sets are publicly available from the CMS. While they are both heavily used in research, few studies have identified the strengths and limitations of these two data sets. One known strength of both is that Medicare demographic data are considered reliable and valid (Research Data Assistance Center [ResDAC], 2012). In addition, because nearly all providers and healthcare organizations in the United States are Medicare certified and provide services to Medicare patients, their information is included in these data sets. Finally, these two data sets are readily available from the CMS, both are free to researchers, and they are easily linked to other data sets from the CMS and other data sets as well (ResDAC, 2012). Both the POS and HCRIS datasets provided data for this study that was not available from other resources.

Area Resource File

The final source of data was the U.S. Department of Health and Human Services Area Resource File (ARF), which is a collection of data from over 50 sources. This file contains information on health facilities, health professions, and socioeconomic and environmental characteristics at the county level. Information for all community characteristic variables was obtained from this file. Information for variables was collected in the year 2010.

Strengths and limitations of the Area Resource File. The main strength of the ARF is that it contains a wide variety of data from multiple sources (Society of General Internal Medicine [SGIM], 2016). The Area Resource File is publicly available and can be linked to a variety of other data sets through FIPS codes. One of the most significant limitations to the ARF is that it is at the county level. Thus, researchers can use the ARF to answer questions at the

county or higher level, but they cannot use the data at a lower level such as the neighborhood level. In addition, the ARF does not contain zip code data and cannot be linked with datasets that have zip code as the only available geographic variable (SGIM, 2016). Finally, some ARF data are available on a yearly basis and other data are available at varying intervals, such as every 10 years. This is a challenge if a researcher wants all of their data to be from the same year or if a researcher is interested in creating a longitudinal study (SGIM, 2016). While the ARF does have some noted limitations, it was useful for this study because it contained county-level data that were available in one dataset and therefore much easier to use than obtaining the necessary county-level data piece by piece.

Only the OASIS assessment data were used to achieve Aim 1. All five data sets were merged to create a comprehensive data set to achieve Aims 2, 3, and 4 of study. The OASIS assessment data, POS data, HCRIS-HHA data, and HHC outcome measures were linked using agency Medicare provider numbers. The ARF was then linked to these data using county FIPS codes that are available as part of the POS and ARF data.

Measures

African American Serving Status

For all aims, *AA serving status* was measured using the proportion of all discharged patients who were African American (Jha et al., 2007; Miller et al., 2006). *African American serving status* was chosen as opposed to "minority-serving status" for several reasons. The majority of the literature that examines differences in where patients seek care compares African American and white patients. In addition, classifying all minorities as one "minority" group obscures the significant differences that are potentially present between the various groups. Finally, there are indications that healthcare organizations that serve a high percentage of African American patients differ from healthcare organizations that serve a high percentage of Hispanic

patients (Jha et al., 2007; Jha et al., 2008). Thus, there might be different factors and mechanisms that affect quality of care for members of different racial minority groups.

There are relatively few studies that have focused specifically on examining disparities *between* healthcare organizations that serve a high percentage of African American patients and those that serve a low percentage of African American patients. In addition, there is no consensus in the literature as to how *AA serving status* should be defined. For example, one nursing home study used quartiles to define *AA serving status* whereas another nursing home study divided the nursing homes into three groups based on proportion of African American patients discharged. However, the one common theme for studies that did not use quartiles (and there was only one nursing home study that used quartiles) was that they defined the top and bottom groups as the "extremes" (Chisholm, Weech-Maldonado, Laberge, Lin, & Hyer, 2013; Jha et al., 2007; Jha et al., 2008) For example, in two different studies of hospitals (one of *High AA* and *Low AA* hospitals and one of High Hispanic and Low Hispanic hospitals) the first group (*High AA* or High Hispanic) was defined as the top 5% of the top quartile; the second group was defined as the rest of the top quartile, and then the third group was defined as the bottom three quartiles. In a different study of hospitals, "High minority serving" was defined as those hospitals in the highest decile of proportion of AA patients (Joynt et al., 2011). Finally, in a study of nursing homes, Chisholm and colleagues (2013) defined "Low" as the bottom 23% of nursing homes (because these nursing homes had no African American patients), "High" was defined as the top 10% of nursing homes (all with greater than 32% AA patients), and "Medium" was defined as the rest of the nursing homes.

Following the example of the studies described above, for the first three aims, home healthcare agencies were initially divided into quartiles based on proportion of African American

patients discharged and then categorized into three groups. Home healthcare agencies in the lowest quartile of proportion of African American patients discharged were considered "*Low AA*," those in the second and third quartiles were considered "*Medium AA*," and those in the top quartile were considered "*High AA*." However, in an effort to provide a clearer picture of differences or similarities between the groups, only the results from the comparison of *High AA HHAs* to *Low AA HHAs* will be included in the results chapter and discussed in the final chapter.

Aim 1

Table 1 defines the study variables to be used, their operational definitions, and data sources for Aim 1.

Patient characteristics. For Aim 1, the variables of interest were *patient characteristics*. Patient characteristics were measured using patient demographic data that were available as part of the CMS's OASIS data set.

Patient gender was categorized as male or female with patients coded as "0" if female and "1" if male. *Patient age*, measured in years, was determined using the patient's assessment effective date (date on which the OASIS discharge assessment was done) and subtracting the patient's date of birth and converting to years. The *average length of stay* variable, measured in days, was created by subtracting the patient's admission date (i.e., the date the patient started receiving home health care for a specific episode of care) from the patient's discharge date (i.e., the date the patient was discharged from home health care, even if the patient was transferred to a nursing home or hospital, for a specific episode of care).

Patient race (self-reported by the patient) was measured using the following binary variables available in the OASIS data set: *American Indian* or *Alaskan Native*, *African American*, *Asian*, *Hispanic*, *Native Hawaiian or Pacific Islander*, and *White*. For all of the above variables,

patients were coded as "0" if they were not identified as that race or "1" if they were identified as that race.

Patient insurance type was measured using the following binary variables that were created: *Medicare_only* (patient has either Medicare fee-for-service or Medicare HMO/managed care), *Medicaid_only* (patient has either Medicaid fee-for-service or Medicaid HMO/managed care), *dual* (patient has either Medicare fee-for-service or Medicare HMO/managed care *and* either Medicaid fee-for-service or Medicaid HMO/managed care), and *dual_plus* (patient has either Medicare fee-for-service or Medicare HMO/managed care *and* Medicaid fee-for-service or Medicaid HMO/managed care *and* one other type of insurance). For all of the above variables, patients were coded as "0" if they did not have the specified insurance or "1" if they did have the specified insurance.

Patient living situation (i.e., the patient's residential circumstance and availability of assistance) was measured using the following binary variables that were created: *pt live*_1(patient lives alone, around-the-clock assistance available), *pt live_2* (patient lives alone, regular daytime assistance available), *pt live_3* (patient lives alone, regular nighttime assistance available), *pt live_4* (patient lives alone, occasional/short-term assistance available), *pt live_5* (patient lives alone, no assistance available), *pt live_6* (patient lives with other person(s) in the home, around-the-clock assistance available), *pt live_7* (patient lives with other person(s) in the home, regular daytime assistance available), *pt live_8* (patient lives with other person(s) in the home, regular nighttime assistance available), *pt live_9* (patient lives with other person(s) in the home, occasional/short-term assistance available), *pt live_10* (patient lives with other person(s) in the home, no assistance available), *pt live)_11* (patient lives in congregate situation [e.g., assisted living], around-the-clock assistance available), *pt live_12* (patient lives in congregate

situation, regular daytime assistance available), *pt live_13* (patient lives in congregate situation, regular nighttime assistance available), *pt live_14* (patient lives in congregate situation, occasional/short-term assistance available), and *pt live_15* (patient lives in congregate situation, no assistance available). For all of the above variables, patients were coded as "0" if they did not have the living situation or "1" if they did have the living situation.

Patient overall status (i.e., patient's health status at the time of the OASIS assessment) was also measured using binary variables that were created as part of this study. The variables were as follows: *pt status_1* (the patient is stable with no heightened risk(s) for serious complications and death [beyond those typical of the patient's age]), *pt status_2* (the patient is temporarily facing high health risk(s) but is likely to return to being stable without heightened risk(s) for serious complications and death [beyond those typical of the patient's age]), *pt status_3* (the patient is likely to remain in fragile health and have ongoing high risk(s) of serious complications and death), *pt status_4* (the patient has serious progressive conditions that could lead to death within a year), and *pt status_5* (the patient's situation is unknown or unclear). For all of the above variables, patients were coded as "0" if they did not have the patient status or "1" if they did have the patient.

Table 1.

Aim 1 Variables, Definitions, and Data Sources

Variable	Definition	Data Source
AA serving status	High, Medium, or Low (determined by percentage of AA patients discharged from HHA in one year)	OASIS
Patient characteristics		OASIS
Patient gender	Whether patient was male or female	
Patient age	Patient's assessment effective date minus patient's date of birth (in years)	
Average length of stay	Patient's discharge date minus patient's start of care date (in days)	
Patient race		OASIS
American Indian or Alaskan Native	Whether or not patient race coded as American Indian or Alaskan Native	
African American	Whether or not patient race coded as African American	
Asian	Whether or not patient race coded as Asian	
Hispanic	Whether or not patient race coded as Hispanic	
Native Hawaiian or Pacific Islander	Whether or not patient race coded as Native Hawaiian or Pacific Islander	
White	Whether or not patient race coded as White	
Patient insurance type		OASIS
Medicare_only	Whether or not patient has either Medicare fee-for-service or Medicare HMO/managed care	
Medicaid_only	Whether or not patient has either Medicaid fee-for-service or Medicaid HMO/managed Care	
Dual	Whether or not patient has either Medicare fee-for-service or Medicare HMO/managed care *and* Medicaid fee-for-service or Medicaid HMO/managed care	
Dual_plus	Whether or not patient has either Medicare fee-for-service or Medicare HMO/managed care *and* Medicaid fee-for-service or Medicaid HMO/managed care *and* one other type of insurance	
Patient living situation		OASIS
pt live_1	Whether or not patient lives alone, around-the-clock assistance available	
pt live_2	Whether or not patient lives alone, regular daytime assistance available	
pt live_3	Whether or not patient lives alone, regular nighttime assistance available	
pt live_4	Whether or not patient lives alone, occasional/short-term assistance available	
pt live_5	Whether or not patient lives alone, no assistance available	
pt live_6	Whether or not patient lives with other person(s) in the home, around-the-clock assistance available	
pt live_7	Whether or not patient lives with other person(s) in the home, regular daytime assistance Available	

Variable	Definition	Data Source
pt live_8	Whether or not patient lives with other person(s) in the home, regular nighttime assistance available	
pt live_9	Whether or not patient lives with other person(s) in the home, occasional/short-term assistance available	
pt live_10	Whether or not patient lives with other person(s) in the home, no assistance available	
pt live_11	Whether or not patient lives in congregate situation (e.g., assisted living), around-the-clock assistance available	
pt live_12	Whether or not patient lives in congregate situation, regular daytime assistance available	
pt live_13	Whether or not patient lives in congregate situation, regular nighttime assistance Available	
pt live_14	Whether or not patient lives in congregate situation, occasional/short-term assistance Available	
pt live_15	Whether or not patient lives in congregate situation, no assistance available	
Patient overall status		OASIS
pt status_1	Whether or not the patient is stable with no heightened risk(s) for serious complications and death (beyond those typical of the patient's age)	
pt status_2	Whether or not the patient is temporarily facing high health risk(s) but is likely to return to being stable without heightened risk(s) for serious complications and death (beyond those typical of the patient's age)	
pt status_3	Whether or not the patient is likely to remain in fragile health and have ongoing high risk(s) of serious complications and death	
pt status_4	Whether or not the patient has serious progressive conditions that could lead to death within a year	
pt status_5	Whether or not the patient's situation is unknown or unclear	

Note: OASIS (Outcome and Assessment Information Set); AA (African American)

Aims 2, 3, and 4

Table 2 defines the study variables to be used, their operational definitions, and data sources for Aims 2, 3, and 4.

Outcome Variables

Aim 2 and Aim 3. For these two aims the outcome variable was *quality of care*. There are currently 13 process of care quality measures and 9 outcome of care quality measures that are publicly reported on the CMS's Home Health Compare. For this study, *quality of care* was measured using six of the nine publicly reported outcome measures. These six measures were chosen because they have been publicly reported since the inception of Home Health Compare in 2003 (Jung et al., 2010) and, compared to the other available outcome of care and process of care quality measures, they all had relatively small amounts of missing data.

The quality measures used in this study were all derived (by the CMS) from the OASIS, which was developed for the purpose of monitoring quality of care at home healthcare agencies (Sangl et al., 2005). OASIS data are collected on all adult Medicare and Medicaid patients receiving skilled health services from a home healthcare agency and all Medicare- and/or Medicaid-certified home healthcare agencies collect and report the same quality measures (Nuccio et al., 2008). Thus, because of the collection mandates for OASIS data by the CMS, quality measures are publicly available from almost all home healthcare agencies across the United States on nearly all of their patients (Mor, 2005). Also, the quality measures on Home Health Compare are publicly available, are targeted at consumers of home healthcare and referring providers, and are used by home healthcare agencies to examine the quality of care they are providing to their patients. Therefore, the measures are potentially relevant to both home healthcare providers and patients (Mor, 2005). Finally, there are no other standardized sets of measures of quality of home health care.

The six outcome of care measures used in this study were risk adjusted by the CMS prior to being posted on the Home Health Compare Web site (Nuccio et al., 2008). Each quality measure that is available on Home Health Compare, with the exception of one utilization measure (not used in this study), has been extensively risk adjusted to allow for the comparison of outcome measures between different agencies (Hittle & Nuccio, 2014; Murtaugh, Peng, Aykan, &Maduro, 2007; Nuccio, Richard, May, and Hittle, 2011; Shaughnessy & Hittle, 2002). Data from the demonstration trials were used to determine the risk factors to be included in OASIS the initial risk adjustment models (Shaughnessy & Hittle, 2002; Jung et al., 2010). Potential risk factors, identified based on clinical and conceptual significance, were included in a logistic regression model specified for each outcome measure. The risk adjustment models were then validated using a "set-aside" sample from the same demonstration trial data (Shaughnessy & Hittle, 2002). New risk adjustment models were recently created using OASIS data collected from home healthcare agencies between 2003 and 2005. One of the concerns with the initial risk factors was that factors related to social support and family assistance were not included in any of the models (Mor, 2005). However, these factors have been included in the model update (Hittle & Nuccio, 2014; Nuccio et al., 2008; Nuccio et al., 2011). Potential risk factors such as race and measures of socioeconomic status were not included in the risk adjustment models (Hittle & Nuccio, 2014; Nuccio et al., 2011).

All of the outcome measures used on Home Health Compare are reported as improvements in either function or health (the higher the percentage of patients, the better the outcome for the home healthcare agency) with the exception of acute care hospitalization, which is categorized as a utilization measure and therefore lower numbers are desirable (CMS, 2010c).

Aim 4. For Aim 4, the outcome (i.e., dependent) variables were the two groups (created for each quality of care variable) of interest—high-quality *High AA HHAs* and low-quality *High AA HHAs*.

Independent Variables

Market characteristics. *Home health agency competition* was measured using the Herfindahl-Hirschman index (HHI), which is an economic measure of competition that ranges from zero (perfect competition) to one (monopoly) (Harrington & Swan, 2003; Castle & Engberg, 2007). The HHI was calculated by summing the squared market shares of all Medicare-certified home healthcare agencies in a county. Market share was defined as the total number of patient discharges per home healthcare agency in one year divided by the total number of patient discharges per county in one year (Zarnett, Coyte, Nauenberg, Doren, & Laporte, 2009). This proportion was then squared and summed to create to create an HHI for home healthcare agencies in each county. An increase in the HHI indicates a lower level of competition whereas a decrease implies a higher level of competition (Harrington & Swan, 2003).

Because there was no way to determine the total number of home healthcare agencies (Medicare-certified and non-Medicare-certified), only discharges from Medicare-certified home healthcare agencies were used to calculate the HHI. Given that the total number of non-Medicare-certified home healthcare agencies is likely extremely small (NAHC, 2010), the HHI calculation should be accurate. The data for calculating the HHI were obtained from the OASIS and the ARF.

Community characteristics. *African American population* was measured as the county population identified as African American divided by the total county population (Miller et al., 2006). *White population* was measured as the county population identified as White divided by the total county population. *Income* was measured in U.S. dollars as the county per capita income

(Miller et al., 2006). *Unemployment* was measured as the number in the county unemployed (Miller et al., 2006) Due to skewness for the variable, *unemployment* was dummy coded into 4 groups: *unemp_1* (low number of unemployed persons), *unemp_2* (medium-low number of unemployed persons), *unemp_3* (medium-high number of unemployed persons), and *unemp_4* (high number of unemployed persons). For the purposes of Aim 3, *unemp_4* was the reference group. *Poverty level* was measured as the percent of county residents below the poverty level (Miller et al., 2006). *Education level* was measured as the number of persons in the county that are 25 years of age and older who have a high school or greater education level. *Total population* was measured as the total county population and *_homehea* was measured as the total number of Medicare- and/or Medicaid-certified home healthcare agencies in the county.

Three binary variables were created to measure location (based on the U.S. Census Bureau definitions)*: metro_mi_0* (not a statistical area—counties that do not quality for inclusion as metropolitan or micropolitan), *metro_mi_1* (metropolitan statistical area—contains a core urban area with a population of 50,000 or greater), and *metro_mi_2* (micropolitan statistical area—contains a core urban area with a population between 10,000 and 50,000) (Harrington & Swan, 2003; Mor et al., 2004). Four binary variables were created to measure census region (based on the U.S. Census Bureau definitions): *censusre_1* (Northeast census area), *censusre_2* (Midwest census area), *censusre_3* (South census area), and *censusre_4* (West census area). All of the binary variables were coded as "0" (the observation not having the specified condition) or "1" (the observation having the specified condition). For the purposes of Aim 3, *metro_mi_3* was the reference group for location and *censusre_4* was the reference group for census region.

The data for all the community characteristic variables were obtained from the Area Resource File.

Organizational characteristics. Three binary variables were created to measure ownership status: *own_fp* (for-profit), *own_nfp* (not for profit), and *own_gov* (government) (Castle & Engberg, 2007). The variables were all coded as "0" (observations not having the specified condition) or "1" (observations having the specified condition). For the purposes of Aim 3, *own_gov* was the reference group for ownership status. *Agency age* was measured as the number of years a home healthcare agency has been Medicare-certified. The data for these variables came from the Provider of Services file.

Size was measured as the sum of patients discharged from a home healthcare agency in one year (Castle & Engberg, 2007). Six binary variables were created to measure the percentage of home healthcare agency patients with specific types of insurance: *mcare_only*, *mcaid_only*, *mcare_other*, *mcaid_other*, *dual*, and *dual_plus*. The variables were all coded as "0" (observations not having the specified condition) or "1" (observations having the specified condition). For the purposes of Aim 3, *mcaid_other* was the reference group for ownership status. Data for the above variables were obtained from the OASIS.

Profit margin was measured as the home healthcare agency's net patient revenue minus total operating expenses divided by the home healthcare agency's net patient revenue (MedPAC, 2005). Data for this variable was obtained from the Healthcare Cost Report Information System—Home Health Agency.

The variable *average length of stay* was defined previously (see Aim 1). Data for the following binary variables were obtained from Home Health Compare. *Aide* was measured as whether or not a home healthcare agency offered nurse aide services. *OT* was measured as whether or not a home healthcare agency offered occupational therapy services. *PT* was measured as whether or not a home healthcare agency offered physical therapy services. *ST* was

measured as whether or not a home healthcare agency offered speech therapy services. *SW* was measured as whether or not a home healthcare agency offered medical social work services.

Nurse staffing characteristics. *Nurse staffing levels* for RNs, LPNs, and NAs were measured as full-time equivalent RNs, LPNs, and NAs employed per home healthcare agency (Castle & Engberg, 2007). The data for these variables were obtained from the Provider of Services file.

Table 2.

Aims 2, 3, and 4 Variables, Definitions, and Data Sources

Variable	Definition	Data Source
Dependent variable		HHC
Quality of care	How often home health patients:	
O1	Got better at walking or moving around	
O2	Got better at getting in and out of bed	
O3	Got better at bathing	
O4	Had less pain when moving around	
O8	Got better at taking their drugs correctly by mouth	
O10	Had to be admitted to the hospital	
AA serving status		OASIS
Low AA – *group_1*	Low percentage of AA patients discharged from home healthcare agency in one year (first quartile—lowest)	
Medium AA – *group_2*	Medium percentage of AA patients discharged from home healthcare agency in one year (quartiles two and three)	
High AA – *group_3*	High percentage of AA patients discharged from home healthcare agency in one year (fourth quartile—highest)	
Market characteristics		OASIS
HHA competition	Herfindahl-Hirschman Index— sum of squared market shares of all Medicare-certified home healthcare agencies in a county	
Community characteristics		ARF
African American population	Percent of population identified as African American	
White population**	Percent of population identifiedas White	
Income	County per capita income	
Unemployment	Number unemployed	
Unemp_1	Low—first quartile (lowest quartile)	
Unemp_2	Medium-low—second quartile	
Unemp_3	Medium-high—third quartile	
Unemp_4	High—fourth quartile (highest quartile)	
Poverty level	Persons (%) below poverty level	
Location		
metro_mi_o	Whether or not area labeled “Not a statistical area”	
metro_mi_1	Whether or not area labeled a “Metropolitan Statistical Area”	
metro_mi_2	Whether or not area labled a “Micropolitan Statistical Area”	

Variable	Definition	Data Source
Census region		
censusre_1	Whether or not Northeast census region	
censusre_2	Whether or not Midwest census region	
censure_3	Whether or not South census region	
censusre_4	Whether or not West census region	
Education level**	Population 25+ (%) with high school or greater level of education	
Total Population**	County total population	
_homehea**	Number of Medicare- and/or Medicaid-certified HHAs in county	
Organizational characteristics		
Ownership status		POS
own_fp	Whether or not HHA was for- profit agency	
own_nfp	Whether or not HHA was not-for-profit agency	
own_gov	Whether or not HHA was government agency	
Agency age	Years HHA Medicare-certified	POS
Size	Sum of total yearly patient discharges per home healthcare agency	OASIS
Insurance status		OASIS
Mcare_only	Percentage of patients discharged in 1yr. who have Medicare fee-for-service or Medicare HMO/managed care insurance	
Mcaid_only	Percentage of patients discharged in 1 yr. who have Medicaid fee-for-service or Medicaid HMO/managed care insurance	
*Mcare_other**	Percentage of patients discharged in 1 yr. who have Medicare HMO/Medicare FFS and another type of health insurance (not Medicaid)	
*Mcaid_other**	Percentage of patients discharged in 1 yr. who have Medicaid HMO/Medicaid FFS and another type of health insurance (not Medicare)	
Dual	Percentage of patients discharged in 1 yr. who have Medicare HMO/Medicare FFS and Medicaid HMO/Medicaid FFS	
Dual_plus	Percentage of patients discharged in 1 yr. who have Medicare HMO/Medicare FFS and Medicaid HMO/FFS and another type of health insurance	
Operating profit margin	(Net patient revenue - Total operating expenses)/Net patient revenue	HCRIS
Average length of stay**	Patient's discharge date minus patient's start of care date (in days)	OASIS
Home health agency services**		HHC
Aide	HHA offers aide services	
OT	HHA offers occupational therapy services	
PT	HHA offers physical therapy services	
ST	HHA offers speech therapy services	
SW	HHA offers medical social work services	

Variable	Definition	Data Source
Nurse staffing characteristics		POS
Nurse staffing levels		
Registered Nurses	Number of FTE RNs employed by HHA	
Licensed Practical Nurses	Number of FTE LPNs employed by HHA	
Nurse Aides	Number of FTE NAs employed by HHA	

Note: HHC (Home Health Compare); OASIS (Outcome and Assessment Information Set); ARF (Area Resource File); POS (Provider of Services); HCRIS (Healthcare Cost Report Information System—Home Health Agency); AA (African American); RN (Registered Nurse); LPN (Licensed Practical Nurse); NA (Nurse Aide); HHA (Home Healthcare Agency); FTE (Full-time equivalent); * = not included in Aim 2; ** = not included in Aim 3 or Aim 4

Sample

Sampling Plan for Aim 1

The sampling frame for Aim 1 was all home healthcare agencies included in the Outcome and Assessment Information Set (OASIS) file in the calendar year (January–December) 2010. The unit of analysis was the home healthcare agency. Because the OASIS file is organized at the patient level, it was first aggregated across episodes of care and up to the agency level so that true comparisons could be made between *High, Medium,* and *Low AA HHAs* (see Data Analysis Plan). Each observation is a unique and independent "episode of care."

The list of home healthcare observations came from the CMS's OASIS 2010 file and this comprised the sampling frame (*n*=5,991,609 observations). Inclusion criteria for each observation were: 1) at least two OASIS assessments, including one admission assessment (also termed "start of care" assessment) and one discharge assessment, and 2) a valid Medicare provider number for the treating home healthcare agency. Observations with the following conditions were excluded from the sample: 1) no race data, 2) transfer to an inpatient facility but not discharged from the home healthcare agency; 3) missing data on any of the included study variables, and 4) length of stay (admission to discharge) greater than 730 days. After the exclusion criteria were applied the sample size was 3,844,010 observations. The OASIS data were aggregated to the agency level, which produced an agency level sample of 9,975 U.S. home healthcare agencies. Finally, the agency-level sample was divided into three groups (*Low AA, Medium AA,* and *High AA*) based on *AA serving status* (see Measures section for definition and determination of *AA serving status*). The final sample was as follows: *Low AA HHAs* contained 2,790 HHAs; *Medium AA HHAs* contained 4,698 HHAs; and *High AA HHAs* contained 2,487 HHAs. Figure 2 provides a sampling schematic of how home healthcare agencies were included in the final sample for Aim 1.

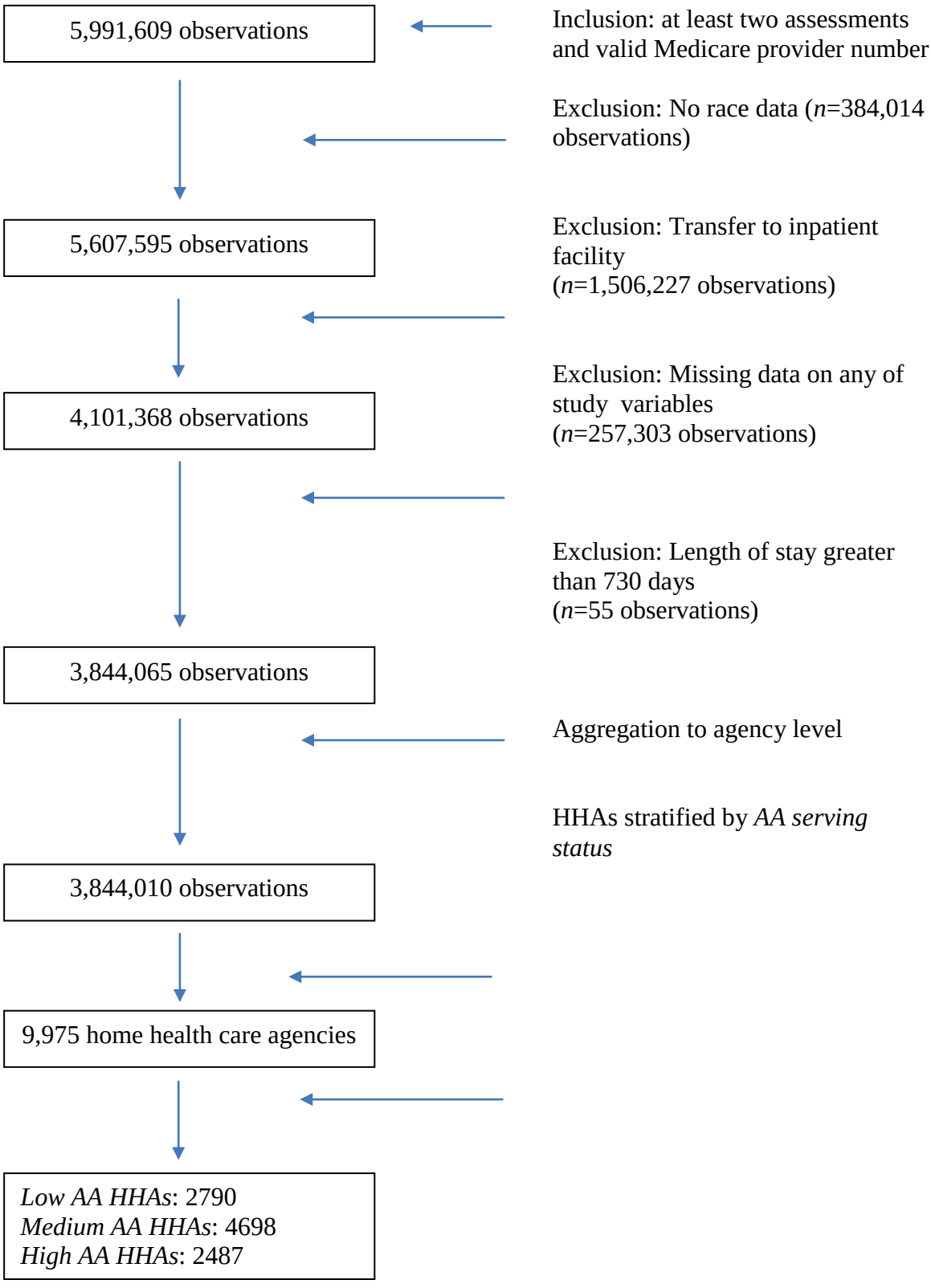

Figure 2. Sampling schematic for Aim 1.

Sampling Plan for Aim 2 and Aim 3

The sampling frame for Aim 2 and Aim 3 was all Medicare-certified home healthcare agencies in the United States. The list of home healthcare agencies came from the CMS's Provider of Services 2010 file (January–December 2010) and this list comprised the sampling frame (*n*=23,175). The unit of analysis was the home healthcare agency. Inclusion criteria were: 1) Medicare certified and 2) valid Medicare provider number. Home healthcare agencies with the following conditions were excluded from the sample: 1) home healthcare agencies that were closed or had no patients, 2) home healthcare agencies that did not provide financial data (profit margin and revenues), 3) home healthcare agencies that were not included in the CMS's Home Health Compare 2011 dataset (January–December 2011), 4) home healthcare agencies without a valid Federal Information Processing Standard (FIPS) code, 5) duplicate entries, and 6) home healthcare agencies with missing data on any of the independent or dependent variables. After the inclusion and exclusion criteria were applied, the sample included 6,394 unique home healthcare agencies. Finally, the sample was divided into three groups (*Low AA*, *Medium AA*, and *High AA*) based on *AA serving status* (see Measures section for definition and determination of *AA serving status*). The groups were as follows: *Low AA HHAs* contained 1,537 HHAs; *Medium AA HHAs* contained 3,245 HHAs; and *High AA HHAs* contained 1,612 HHAs. Figure 3 provides a sampling schematic of how home healthcare agencies were included in the final sample for Aim 2 and Aim 3.

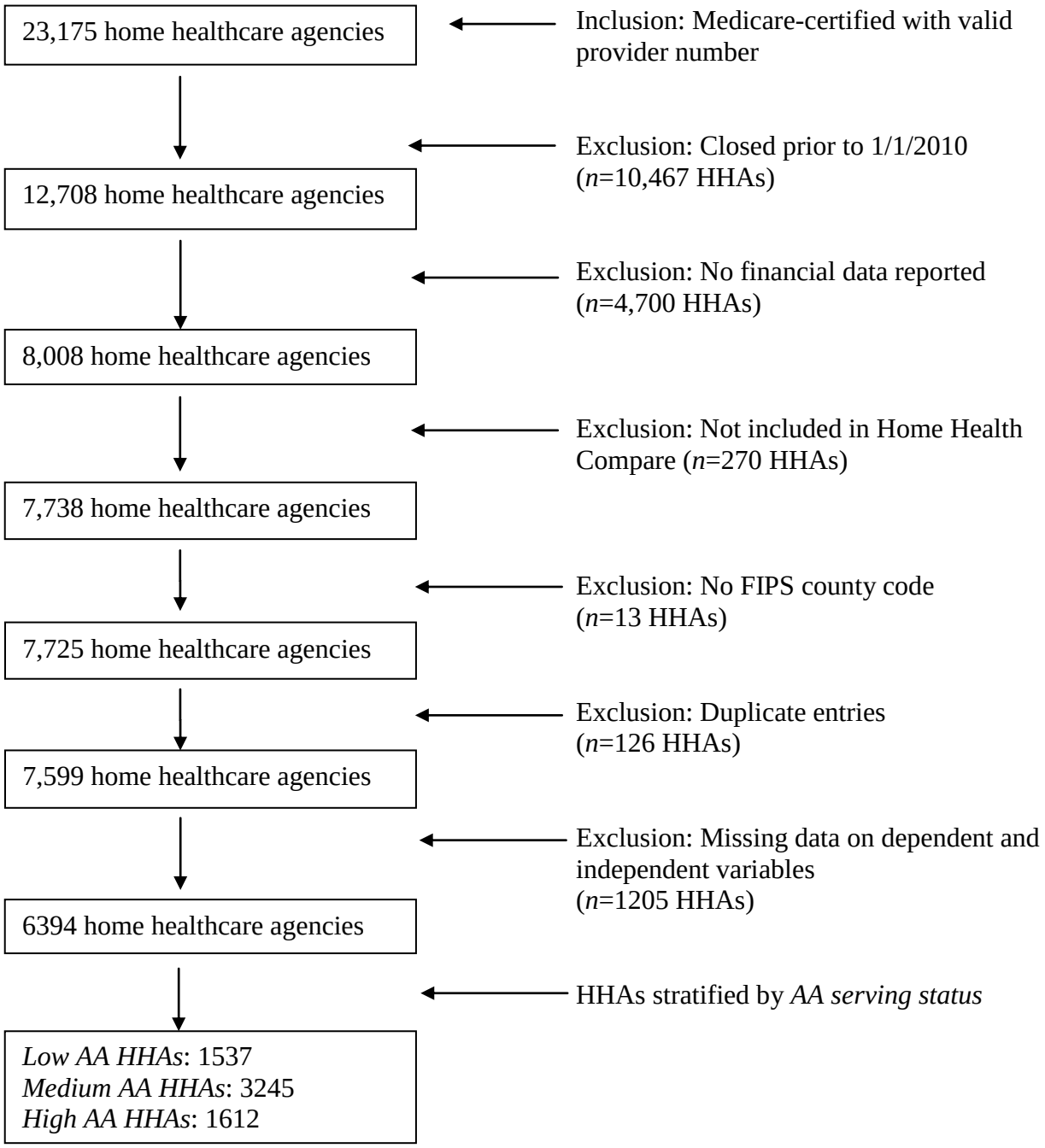

Figure 3. Sampling schematic for Aim 2 and Aim 3.

Sampling Plan for Aim 4

For Aim 4, the sampling frame was all home healthcare agencies defined as *High AA* in the sample used for Aim 2 and Aim 3 (*n*=1612). Following the same classification scheme used

for determination of *AA serving status*, home healthcare agencies included in the sample were stratified (high to low) by CMS Home Health Compare quality measure value (see Measures section for full details of quality measures) for each of the six quality of care outcome variables. Based on the available literature on minority-serving healthcare organizations (Gaskin and LaVeist, 2009), those home healthcare agencies in the top quartile were defined as *high-quality* and those in the bottom three quartiles were defined as *low-quality*. The exception was for outcome variable O10: patient had to be admitted to the hospital. For this variable a low score was considered high-quality so home healthcare agencies in the bottom quartile were considered high quality and those in the top three quartiles were considered low quality. Across all quality of care variables, the number of home healthcare agencies per group (high- and low-quality) ranged from a low of 413 home healthcare agencies to a high of 1,199 home healthcare agencies.

Data Analysis Plan

All analyses were conducted using SAS version 9.2 (SAS Institute, Inc., Cary, NC). Statistical significance was assessed at $p < 0.05$.

Data Aggregation, Linkage, and Categorization of Datasets

Analyses for all aims occurred at the agency level. The OASIS assessment data were only available at the patient level and the data from the other data sets were available at the agency level. Therefore, prior to any analyses, the OASIS data had to be aggregated to the agency level.

A master file with all necessary variables from the OASIS data set was created and then aggregated across episodes of care to the agency level. Aggregating across episodes of care was chosen because this method provided the percentage of "episodes of care" for each different race for each agency. For example, if an African American patient was admitted to and discharged from an agency three times in the calendar year 2010 (each time from admission to discharge defined as an "episode of care"), these episodes of care would each be counted separately in the

analysis, thus giving a true sense of the proportion of African American (or other race) patients served by a home healthcare agency. Alternatively, aggregating first to the patient level and then up to the agency level would have provided percentages for unique patients but would not provide a true count of the percentages of different patients served by home healthcare agencies. In addition, because there is only one observation per episode of care, lack of independence was not a concern for this study.

To achieve Aim 1, no further action was necessary. To achieve Aims 2, 3, and 4, the aggregated POS file was then linked with the OASIS file, the HCRIS-HHA, and the HHC file via Medicare provider numbers that were available in all the files. Then, the ARF was linked to the overall dataset using FIPS codes (U.S. Census Bureau, 2010b). After the data were aggregated and linked, the two datasets (OASIS only and linked dataset) were categorized based on *AA serving status* (see Measures section).

Sensitivity Analyses

For the first three aims, home healthcare agencies were also categorized into three groups (using the same methods described in the Measures section) based on volume, rather than proportion, of African American patients discharged. The data sets categorized by volume were analyzed using the same method that was used for the data sets categorized by proportion.

For the fourth aim, home healthcare agencies were considered high quality if they were in the top 10% of all home healthcare agencies included in the sample. The rest of the home healthcare agencies in the sample were considered low quality. The data sets were analyzed using the same method that was used for the data sets categorized by quartiles.

Univariate Analysis

For both datasets (the OASIS and the linked dataset), univariate statistics such as the mean, range, standard deviation, box plots, and histograms were created. These descriptive

statistics were used to determine whether or not the data contained abnormalities that needed to be addressed, to identify assumptions that might be violated, to assess the data for outliers, to examine the distribution of the variables, and to describe the two different study samples.

Bivariate Analysis

For Aim 1, tables were generated to summarize the means of patient characteristics in *High*, *Medium*, and *Low AA HHAs*. Comparisons were made between *High*, *Medium*, and *Low AA HHAs* using one-way analysis of variance (ANOVA) to obtain the overall comparison of the means of the three groups, followed by pairwise comparisons (*Low AA* to *Medium AA*; *Low AA* to *High AA*; *Medium AA* to *High AA*) with Tukey's adjustment for multiple comparisons to determine if there was a difference between any two sets of means.

For Aim 2, tables were generated to summarize the means of quality of care in *High*, *Medium*, and *Low AA HHAs* and to summarize the means and frequencies of market, community, organizational, and nurse staffing characteristics in *High*, *Medium*, and *Low AA HHAs*. Comparisons were made between *High*, *Medium*, and *Low AA HHAs* using the chi-square test (χ^2) of independence for categorical variables and, for continuous variables, one-way ANOVA to obtain the overall comparison, followed by pairwise comparisons (*Low AA* to *Medium AA*; *Low AA* to *High AA*; *Medium AA* to *High AA*) with Tukey's adjustment for multiple comparisons to determine if there was a difference between any two sets of means. In addition, for the linked dataset a correlation matrix using Pearson product-moment correlation coefficients was created to examine correlations between the variables.

Prior to performing the chi-square test of independence and one-way ANOVA, the data were checked to ensure that they met the assumptions for each type of analysis. The chi-square test of independence has two assumptions that needed to be met: The two variables are categorical and the two variables consist of two or more categorical, independent groups.

ANOVA has six assumptions that needed to be met: Dependent variables should be continuous; independent variables should consist of two or more categorical groups that are independent of each other; independence of observations (i.e., there is no relationship between observations in each group or between the groups themselves); there are no significant outliers; dependent variables should be approximately normally distributed for each category of independent variable; and homogeneity of variances (i.e., population variances in each group should be equal) (Tabachnick & Fidell, 2007).

Multivariate Analyses

Aim 3—linear multiple regression. Linear multiple regression was used to assess whether and how much individual variables and specific blocks of variables contributed to any observed differences in quality of care between *High*, *Medium*, and *Low AA HHAs*. Multiple regression can be used to determine the effect of a set of predictors (i.e., independent variables) on an outcome variable by producing an overall model fit (i.e., percent of variance explained) and a determination of the contribution of each of the predictors individually and as sets to the total variance explained (Laerd statistics, 2015a; Tabachnick & Fidell, 2007).

To achieve this aim, the independent variables were entered in blocks, determined a priori and based on the theory and conceptual model (Cohen, Cohen, West, & Aiken, 2003; Polit, 2010). The initial model had the primary predictor variable of *AA serving status*. *Market characteristics* were entered as the second block of independent variables, followed by *community characteristics* as the third block, *organizational characteristics* as the fourth block, and finally *nurse staffing characteristics* as the fifth block. There were six outcome variables and for each outcome variable five different models were produced. The full linear regression equation was as follows:

$$\textit{Quality of care} = \beta_o + \beta_1 \textit{AA serving status} + \beta_2 \textit{Market characteristics} + \beta_3 \textit{Community characteristics} + \beta_4 \textit{Organizational characteristics} + \beta_5 \textit{Nurse staffing characteristics} + \varepsilon$$

For each model, an overall *F* statistic, associated *p* value and R^2 were generated. Parameter estimates (and associated *p* values), standard errors, and 95% confidence intervals for each individual variable were also produced. The overall *F* statistic and associated *p* value were used to test the null hypothesis that all of the model coefficients were zero. The R^2 value was a measure of the percentage of variance explained by all the variables included in the specific model. The standard error, in addition to R^2, provided an indication of how well the model fit the data. The 95% confidence interval for each variable offered a measure of precision: a wide interval indicated less precision for the parameter estimate whereas a narrower confidence interval signified greater precision (Polit, 2010; University of California at Los Angeles [UCLA] Statistical Consulting Group, 2015a; UCLA Statistical Consulting Group, 2015b).

In addition, a second *F* statistic (different than the one produced for the overall model) and associated *p* value were generated to determine if the contribution of each set of variables (i.e., the change in R^2 produced when additional sets of variables were added to each model) was statistically significant (Cohen et al., 2003).

As with other statistical tests, linear multiple regression has assumptions that the data need to meet for the test to produce valid results. Linear multiple regression has the following eight assumptions: The dependent variable is measured on a continuous scale; there are two or more independent variables (can be continuous or categorical); independence of observations (i.e., no relationship between the observations in each group or between the groups themselves); there is a linear relationship between the independent and dependent variable(s); an absence of heteroscedasity; an absence of multicollinearity (i.e., two or more independent variables are

highly correlated with each other); there are no outliers ; and residuals are approximately normally distributed (Laerd statistics, 2015a; Polit, 2010; Tabachnick & Fidell, 2007).

Aim 4—logistic regression analysis. Logistic regression was used to determine which factors (market, community, organizational, and nurse staffing) or subset of these factors differentiated high- and low-quality *High AA HHAs*. Logistic regression is used to predict a dichotomous outcome from a group of predictor variables that could be categorical, continuous, or a combination of the two (Tabachnick and Fidell, 2007). Logistic regression predicts the probability of a specific outcome. It was chosen for the analysis for aim 4 because of the use of a dichotomous outcome variable (high-quality vs. low-quality*)* and its flexibility. There are no assumptions about the distributions of the predictor variables. Predictor variables do not have to be normally distributed and variance within groups does not have to be equal (Polit, 2010; Tabachnick and Fidell, 2007).

For aim 4, logistic regression was used to determine which factors (market, community, organizational, and nurse staffing) predicted quality of care in *High AA HHAs*. For each model, a likelihood chi-square (χ^2) ratio was produced. The likelihood ratio, if significant, is an indication that the model fits significantly better than one with only the constant. In addition, parameter estimates and associated *p* values, standard errors, Wald chi-square (χ^2) and associated *p* values, odds ratios, and 95% confidence intervals for each individual variable were also produced (Tabachnick & Fidell, 2007; UCLA Statistical Consulting Group, 2015c; UCLA Statistical Consulting Group, 2015d).

Although logistic regression does not have a large number of assumptions, it does have the following four: The outcome variable should be dichotomous; there are one or more independent variables (these can be categorical and/or continuous variables); observations should

be independent and the outcome variable categories should be exhaustive and mutually exclusive; and there should be a linear relationship between continuous independent variables and the log odds of the outcome variable (Laerd statistics, 2015b; Polit, 2010; Tabachnick & Fidell, 2007).

Summary

This chapter presented the specific research methodology that was used to achieve the goals of the study. The research design, secondary data sources, and study variables and how they were measured were described. Next, the sampling and analytical plan were outlined and discussed. Finally, analytical issues that have been identified and methods that used to address them were described.

CHAPTER 5: RESULTS

Introduction

This chapter reports the results of the statistical analyses used to achieve each of the four study aims: 1) to compare patient characteristics in *High* and *Low AA HHAs;* 2) to compare quality of care in *High* and *Low AA HHAs*; 3) assess the relative influence of market, community, organizational, and nurse staffing characteristics on quality of care at *High* and *Low AA HHAs*; and 4) to identify the factors (market, community, organizational, and nurse staffing) that differentiate high- and low-quality *High AA HHAs*. A description of the final samples for each aim and results of the analyses for each aim are included in the chapter.

Study Samples

Aim 1

The sampling frame for Aim 1 was all home healthcare agencies included in the OASIS file in calendar year 2010. The OASIS data were originally patient-level data. After inclusion and exclusion criteria were applied, the data were aggregated to the agency level, which produced an agency level sample of 9,975 U.S. home healthcare agencies. Home healthcare agencies were initially divided into quartiles based on proportion of African American patients discharged and then categorized into three groups. Home healthcare agencies in the lowest quartile of proportion of African American patients discharged were considered "*Low AA*," those in the second and third quartiles were considered "*Medium AA*," and those in the top quartile were considered "*High AA*." The three groups were as follows: *Low AA HHAs* contained 2,790 HHAs; *Medium AA HHAs* contained 4,698 HHAs; and *High AA HHAs* contained 2,487 HHAs.

Aim 2 and Aim 3

The sampling frame for Aim 2 and Aim 3 was all Medicare-certified home healthcare agencies included in the CMS's Provider of Services 2010 file. After inclusion and exclusion criteria were applied, the sample included 6,394 unique home healthcare agencies. Following the same categorization scheme that was used for Aim 1, the sample was divided into three groups: *Low AA HHAs* contained 1,537 HHAs; *Medium AA HHAs* contained 3,245 HHAs; and *High AA HHAs* contained 1,612 HHAs.

To provide a more clear distinction between the groups, only results from the comparison of *High AA HHAs* to *Low AA HHAs* for Aims 1, 2, and 3are included in this chapter and discussed in the next chapter.

Aim 4

The sampling frame for Aim 4 was all home healthcare agencies defined as *High AA* in the sample used for Aim 2 and Aim 3 (*n*=1612). Home healthcare agencies were stratified by the quality measure value they had for each of the six outcome variables. Then, for each outcome variable, home healthcare agencies were divided into two groups. *High AA HHAs* in the top quartile were defined as *high-quality* and those in the bottom three quartiles were defined as *low-quality*. The exception was for outcome variable O10—patient had to be admitted to the hospital. For this variable a low score was considered high quality so home healthcare agencies in the bottom quartile were considered high quality and those in the top three quartiles were considered low quality. Table 3 shows each outcome variable and the number of HHAs included in each of the two groups.

Table 3.

Aim 4 Outcome Variables and Groups

Outcome variable—how often home healthcare patients:	Group1: High-quality High AA HHAs	Group 2: Low-quality High AA HHAs
O1: got better at walking or moving around	437	1175
O2: got better at getting in and out of bed	423	1189
O3: got better at bathing	427	1185
O4: had less pain when moving around	413	1199
O8: got better at taking their medications correctly by mouth	427	1185
O10: had to be admitted to the hospital	438	1174

Note: AA (African American); HHA (Home Healthcare Agency)

Results

Aim 1

Patient characteristics of *High*, *Medium* and *Low AA HHAs* were compared using one-way ANOVA and pairwise comparison followed by Tukey's adjustment for multiple comparisons. Table 4 presents the descriptive statistics and pairwise comparison (*Low AA vs. High AA*) results for the variables included in Aim 1.

Table 4.

Descriptive Statistics and Pairwise Comparison Results of Aim 1 Variables by Level of AA Serving Status

	Low AA serving status			High AA serving status			Low AA vs. High AA^
Variable	Mean/%	Std. Dev	Range	Mean/%	Std. Dev	Range	
Gender (male)	0.37	0.15	0–1	0.38	0.15	0–1	+
Age (years)	75.51	6.98	18.5–97	68.82	7.72	18–95	+
Length of stay (days)	83.47	83.4	0–726.4	143.61	107.48	2–719.65	+
Patient race							
American Indian or Alaskan Native	1[#]	0.05	0–1	1[#]	0.02	0–0.5	+
Asian	3	0.12	0–1	2	0.05	0–0.5	+
Black	1	0.01	0–0.03	58	0.21	0.28–1	+
Hispanic	22	0.35	0–1	8	0.11	0–0.71	+
Native Hawaiian or Pacific Islander	0.4	0.04	0–0.88	0.2	0.01	0–0.33	+
White	74	0.36	0–1	32	0.21	0–1	+
Patient insurance type							
Medicare only	85	0.24	0–1	86	0.24	0–1	+
Medicaid only	6	0.15	0–1	8	0.19	0–1	+
Dual	5	0.15	0–1	4	0.11	0–1	+
Dual plus	0.07	0.006	0–0.17	0.1	0.02	0–0.67	-
Patient living status							
Patient lives alone; around-the-clock assistance available	15	0.12	0–1	16	0.12	0–1	+
Patient lives alone; regular daytime assistance available	3	0.06	0–1	4	0.06	0–1	+
Patient lives alone; regular nighttime assistance available	1	0.02	0–0.5	1	0.03	0–1	-
Patient lives alone; occasional/short-term assistance available	8	0.09	0–1	8	0.09	0–1	-
Patient lives alone; no assistance available	1	0.05	0–1	2	0.06	0–1	+
Patient lives with other person(s); around-the-clock assistance available	52	0.2	0–1	49	0.18	0–1	+
Patient lives with other person(s); regular daytime assistance available	2	0.05	0–1	4	0.07	0–1	+
Patient lives with other person(s); regular nighttime assistance available	5	0.09	0–1	5	0.07	0–1	-

	Low AA serving status			High AA serving status			Low AA vs. High AA^
Patient lives with other person(s); occasional/short-term assistance available	3	0.07	0–1	4	0.07	0–1	+
Patient lives with other person(s); no assistance available	0.3	0.02	0–0.33	1	0.03	0–0.44	+
Patient lives in congregate situation; around-the-clock assistance available	9	0.15	0–1	5	0.08	0–1	+
Patient lives in congregate situation; regular daytime assistance available	0.2#	0.01	0–0.5	0.2#	0.01	0–0.47	-
Patient lives in congregate situation; regular nighttime assistance available	0.03	0.003	0–0.1	0.04	0.01	0–0.33	-
Patient lives in congregate situation; occasional/short-term assistance available	0.3#	0.01	0–0.33	0.3#	0.02	0–0.36	-
Patient lives in congregate situation; no assistance available	0.2	0.02	0–0.67	0.3	0.02	0–0.53	+
Patient overall status							
Patient stable	53	0.2	0–1	57	0.2	0–1	+
Patient temporarily facing heightened health risk, but likely to return to being stable	24	0.17	0–1	22	0.16	0–1	+
Patient is likely to remain in fragile health and have ongoing risk of serious health complications	4	0.07	0–1	2	0.06	0–1	+
Patient has serious progressive conditions that could lead to death within a year	0.3	0.02	0–0.74	1	0.04	0–1	+
Unknown or unclear	20	0.19	0–1	17	0.16	0–1	+

Note: Low AA = Low AA HHAs; High AA = High AA HHAs; HHA (Home Healthcare Agency); AA (African American); Std. Dev. = Standard Deviation; N = 2790 for Low; N = 2487 for High; # = number rounded to nearest tenth; + = pairwise comparison (Low AA vs. High AA) significant (p <.05, <.01, <.001, <.0001); - = pairwise comparison (Low AA vs. High AA) not significant (p >.05); ^ = post hoc Tukey's HSD.

Descriptive statistics. *High AA* home healthcare agencies had an average of 58% of AA discharges while *Low AA HHA*s had an average of 1% AA discharges. In comparison, *High AA HHAs* had an average of 32% White discharges whereas *Low AA HHAs* had an average of 74% White discharges. Interestingly, *High AA HHAs* had fewer average Hispanic discharges—approximately 8%—whereas *Low AA HHAs* had an average of 22% Hispanic discharges.

The average length of stay for patients of *High AA HHAs* was approximately 144 days compared to 83 days for patients of *Low AA HHAs*. The average age of patients of *High AA HHAs* was lower—nearly 69 years of age compared to *Low AA HHAs*, where the average age was 75 years.

In terms of patient status (e.g., patient is stable with no serious medical conditions), more patients, on average, of *High AA HHAs* were considered "stable with no serious medical conditions" (an average of 57% of patients) compared to *Low AA HHAs* (an average of 53% of patients). However, nearly twice as many *High AA* home healthcare patients (4% compared to 2%) were "likely to remain in fragile health and have ongoing serious risk of health complications." Finally, an average of 1% of patients of *High AA HHAs* were considered to have "serious progressive conditions that could lead to death within a year" compared to *Low AA HHAs* where the average was 0.3% in the same category.

ANOVA results. One-way ANOVAs with Tukey's adjustment for multiple comparisons were used to compare the group means for each of the 33 variables. The null hypothesis that all group means were the same was not rejected for the following four variables: a) dual plus (percentage of patients with Medicare *and* Medicaid *and* another type of insurance); b) patient lives alone, regular nighttime assistance available; c) patient lives in congregate situation, regular

daytime assistance available; and d) patient lives in congregate situation, regular nighttime assistance available.

There were a total of 29 variables where the null hypothesis was rejected. For each of these variables further testing—comparing *Low AA* to *Medium AA*, *Low AA* to *High AA*, and *Medium AA* to *High AA*—was done and Tukey's adjustment was used to adjust for type I error (i.e., incorrectly rejecting the null hypothesis).

Aim 2

Quality of care variables for *High, Medium* and *Low AA HHAs* were compared using one-way ANOVA. Market, community, organizational, and nurse staffing characteristics of *High, Medium* and *Low AA HHAs* were also compared using one-way ANOVA (followed by pairwise comparisons and Tukey's adjustment for multiple comparisons) and the chi-square (χ^2) test of association. Table 5 presents the descriptive statistics for the variables included in Aim 2.

Table 5.

Descriptive Statistics and Pairwise Comparison Results of Aim 2 Variables by Level of AA Serving Status

	Low AA serving status			High AA serving status			Low AA vs. High AA^/Chi-square
Variable	Mean/%	Std. Dev	Range	Mean/%	Std. Dev	Range	
Outcome of care variables							
How often home healthcare patients:							
O1: got better at walking or moving around	55.09	11.29	13–100	54.91	14.45	8–100	-
O2: got better at getting in and out of Bed	51.93	13.38	7–100	49.26	16.68	0–100	+
O3: got better at bathing	63.57	12.09	2–100	62.71	16.86	0–100	-
O4: had less pain when moving around	65.77	14.93	8–100	64.74	19.34	0–100	-
O8: got better at taking their medications correctly by mouth	42.27	14.58	0–98	46.1	17.37	0–100	+
O10: had to be admitted to the hospital	25.24	7.51	2–60	27.15	10.05	0–60	+
Patient race							
American Indian or Alaskan Native	0.73	0.04	0–0.97	0.59	0.01	0–0.33	-
Asian	2.55	0.12	0–1	2.28	0.05	0–0.47	-
Black	1.53	0.01	0–0.03	50.14	0.21	0.23–1	+
Hispanic	25.43	0.37	0–1	7.89	0.11	0–0.72	+
Native Hawaiian or Pacific Islander	0.25	0.01	0–0.23	0.18	0.01	0–0.16	-
White	69.88	0.37	0–1	39.25	0.22	0–0.77	+
Market characteristics							
Herfindahl index	0.07	0.12	0.005–1	0.05	0.09	0.005–1	+
Community characteristics							
African American population (%)	2.62	6.67	0–72.2	4.82	8.99	0.1–58.1	+
White population (%)	90.25	8.95	24.9–98.6	85.62	14.06	39.6–98.4	+
Per capita income (U.S. dollars)	39,172	12,875	15,452–129,956	38,577	8,600	19,721–129,956	-
Number of unemployed persons	5,290	14,540	51–150,347	19,285	47,373	56–150,347	+
Persons below poverty level (%)	13.18	6.97	3.1–40.4	12.96	4.07	4.9–35.9	-
Location							
Not a statistical area	35.91	0.48	0–1	58.36	0.49	0–1	+
Metropolitan statistical area	37.93	0.48	0–1	28.6	0.45	0–1	+

	Low AA serving status			High AA serving status			Low AA vs. High AA^/Chi-square
Micropolitan statistical area	26.15	0.44	0–1	13.01	0.34	0–1	+
Census region							
Northeast census region	1.24	0.11	0–1	0.37	0.06	0–1	+
Midwest census region	35.13	0.48	0–1	37.5	0.48	0–1	-
South census region	19.39	0.39	0–1	31	0.46	0–1	+
West census region	44.24	0.50	0–1	31.23	0.46	0–1	+
Population 25+ with high school or greater level of education	59,062	167,699	929–1,853,106	239,135	583,673	1521–1,853,106	+
County total population	128,651	370,549	1628–3,961,127	501,872	1,247,945	2445–3,961,127	+
Number of Medicare- and/or Medicaid-certified HHAs in county	12.34	47.7	0–480	56.4	151.48	0–480	+
Organizational characteristics							
Ownership status							
For-profit agency	73.26	0.44	0–1	92.87	0.26	0–1	+
Not-for-profit agency	20.23	0.4	0–1	5.82	0.23	0–1	+
Government agency	6.51	0.25	0–1	1.3	0.11	0–1	+
Agency age (years)	16.04	13.49	1.25–45.5	11.41	10.29	1.29–45.5	+
Size (total discharges in one year)	378.34	526.34	1–7594	353.16	791.16	2–12,431	-
Insurance status							
Medicare only	88.27	0.19	0–1	90.2	0.17	0–1	+
Medicaid only	3.88	0.07	0–0.77	5	0.11	0–0.97	+
Dual	4.77	0.14	0–0.97	3.14	0.09	0–1	+
Dual plus	0.05	0.004	0–0.087	0.09	0.01	0–0.35	-
Operating profit margin	–0.28	5.19	197.25–4.38	0.02	2.39	25.12–76.39	+
Length of stay (days)	79.1	65.01	1–654.16	125.59	83.87	21.5–1049.53	+
Home healthcare agency services							
HHA offers aide services (Yes)	96.55	n/a	3.45–96.55	97.21	n/a	2.79–97.21	+
HHA offers occupational therapy services (Yes)	92.45	n/a	7.55–92.45	94.86	n/a	5.14–94.86	+
HHA offers physical therapy services (Yes)	99.15	n/a	0.85–99.15	99.13	n/a	0.87–99.13	-
HHA offers speech therapy services (Yes)	86.47	n/a	13.53–86.47	91.82	n/a	8.18–91.82	+
HHA offers medical social work services (Yes)	82.04	n/a	17.96–82.04	90.64	n/a	9.36–90.64	+

	Low AA serving status			High AA serving status			Low AA vs. High AA^/Chi-square
Nurse staffing characteristics							
Number of FTE Registered Nurses	7.17	9.39	0–103.84	8.35	44.37	0–1380.5	-
Number of FTE Licensed Practical Nurses	2.74	11.89	0–425	2.49	9.82	0–360	-
Number of FTE Nurse Aides	6.91	121.03	0–4736	4.63	20.1	0–576.75	-

Note: Low AA = Low AA HHAs; High AA = High AA HHAs; HHA (Home Healthcare Agency); AA (African American); Std. Dev. = Standard Deviation; FTE = full-time equivalent; N = 1537 for Low; N = 1612 for High; + = pairwise comparison (Low AA vs. High AA)/Chi-square significant (p <.05, <.01, <.001, <.0001); - = pairwise comparison (Low AA vs. High AA)/Chi-square not significant (p >.05); ^ = post hoc Tukey's HSD.

Descriptive statistics.

Outcome of care variables. There were six outcome of care variables. For five of the six outcome of care variables a higher average percentage indicates better care. For the final outcome of care variable, a lower percentage indicated higher-quality care.

High AA home healthcare agencies had a lower average percentage for outcome variables O1 (how often home health patients got better at walking or moving around), O2 (how often home healthcare patients got better at getting in and out of bed), O3 (how often home healthcare patients got better at bathing) and O4 (how often home healthcare patients had less pain when moving around). For the fifth outcome indicator (O8: how often home healthcare patients got better at taking their medications correctly by mouth), *High AA HHAs* had a higher average percentage of patients who "got better at taking medications by mouth"—46% compared to *Low AA HHAs* whose average was 42%. For outcome variable O10 (how often home healthcare patients had to be hospitalized), *Low AA HHAs* had an average of 25% of patients who "had to be admitted to the hospital" whereas *High AA HHAs* had an average of 27% (a lower score is better).

Race. *High AA* home healthcare agencies had an average of 50% AA discharges, nearly 8% Hispanic discharges, and almost 40% White discharges. In comparison, *Low AA HHAs* had an average of 1% AA discharges, 25% Hispanic discharges, and nearly 70% White discharges.

Market and community characteristics. Home healthcare agencies from both groups had fairly similar levels of competition as measured by the Herfindahl-Hirschman Index (HHI). *Low AA* home healthcare agencies had the highest average HHI at 0.07 compared to *High AA HHAs*, where the average HHI was 0.05. The average total population for counties with *High AA HHAs* was almost four times higher than that of counties with *Low AA HHAs* (501,872 compared to

128,651). In addition, the average percentage of the population identified as Black in counties with *High AA HHAs* was almost double (4.82%) that of counties with *Low AA HHAs* (2.62%). As well, the average percentage of population identified as White in counties with *High AA HHAs* was approximately 85% whereas the average percentage identified as White in counties with *Low AA HHAs* was 90%. Compared to *Low AA HHAs*, *High AA HHAs* were located in counties with a higher average number of home healthcare agencies—56 per county compared to 12.

Compared to counties with *Low AA HHAs* counties with *High AA HHAs* had an average of four times as many persons with a high school diploma or greater (239,135 persons compared to 59,062 persons). The average number of people unemployed (persons over the age of 18) in counties with *High AA HHAs* was over three times higher (19,285) compared to counties with *Low AA HHAs* (5,290).

Organizational characteristics. *High AA* home healthcare agencies had an average of 50% AA discharges while *Low AA HHAs* had an average of close to 2% AA discharges. In comparison, *High AA HHAs* had an average of 40% White discharges whereas *Low AA HHAs* had an average of almost 70% White discharges. Interestingly, *High AA HHAs* had fewer average Hispanic discharges—approximately 8%—than *Low AA HHAs* (who had an average of 25% Hispanic discharges).

The average length of stay for patients of *High AA HHAs* was approximately 125 days compared to 79 days for patients of *Low AA HHAs*. Average agency age (in years) was higher for *Low AA HHAs* compared to *High AA HHAs*—slightly over 16 years for *Low AA HHAs* compared to an average of 11.41 years for *High AA HHAs*.

Average operating profit margin was higher in *High AA HHAs* compared to *Low AA HHAs* (0.02 compared to -0.28). On average, more *High AA HHAs* were for-profit (nearly 93%), though an average of almost 75% of *Low AA HHAs* were also classified as for-profit. An average of approximately 6% of *High AA HHAs* were not-for-profit compared to 20% of *Low AA HHAs*. In general, fewer home healthcare agencies were government-owned—over 6% of *Low AA HHAs* compared to 1% of *High AA HHAs*.

Nurse staffing characteristics. *Low AA* home healthcare agencies employed a higher average number of FTE home healthcare aides compared to *High AA HHAs* (approximately 7 vs. over 4). *Low* and *High AA* home healthcare agencies each employed a similar average number of FTE LPNS—2.7 compared to 2.5. Similarly, *High AA HHAs* employed an average of slightly over 8 FTE RNs whereas *Low AA HHAs* employed an average of about 7 FTE RNs.

Chi-square (χ^2) and ANOVA results.

Categorical variables. The Chi-square test of association was used to determine if there was a statistically significant relationship between levels of AA serving status (*High AA*, *Medium AA*, and *Low AA*) and each of five categorical variables (each categorical variable had two levels). The null hypothesis that there was no statistically significant relationship was rejected for a total of four variables: a) Aide (home healthcare agency offers home healthcare aide services); b) OT (home healthcare agency offers occupational therapy services); c) ST (home healthcare agency offers speech therapy services); and d) SW (home healthcare agency offers medical social work services). The null hypothesis was not rejected (i.e., there was no statistically significant relationship between group and the variable) for one variable: PT (home healthcare agency offers physical therapy services).

Continuous variables. One-way ANOVAs with Tukey's adjustment for multiple comparisons were used to compare the group means for each of the 42 continuous variables (see Table 5). The null hypothesis that all group means were the same was not rejected for the following eight variables: a) total American Indian/Alaskan Native discharges, b) total Asian discharges, c) Dual plus, d) number of FTE home healthcare aides, e) per capita income, f) Census region Northeast, g) outcome variable O1 (how often home health patients got better at walking or moving around), and h) outcome variable O3 (how often home healthcare patients got better at bathing).

There were a total of 34 variables where the null hypothesis was rejected. For each of these variables, further testing (see Table 5) comparing *Low AA* to *Medium AA*, *Low AA* to *High AA*, and *Medium AA* to *High AA* was done and Tukey's adjustment was used to adjust for type I error (i.e., incorrectly rejecting the null hypothesis).

Correlation matrix. Pearson product-moment correlations among the independent and dependent variables were produced in a correlation matrix. Correlations of greater than 0.90 are considered to be highly correlated (Tabachnick & Fidell, 2007). There were four independent variables with a correlation of greater than 0.90: Total population, Number of Medicare/Medicaid-certified HHAs, Number of unemployed persons, and Population 25+ with high school or greater level of education. When two variables are highly correlated, one of the two should be dropped because multicollinearity can contribute to increased standard errors in regression models (Tabachnick & Fidell, 2007). Due to these concerns, the following three variables, thought to be of lesser importance than the fourth based on the theoretical and conceptual models, were dropped from the analysis for Aim 3 and Aim 4: Total population,

Number of Medicare/Medicaid-certified HHAs, and Population 25+ with high school or greater level of education.

Aim 3 and Aim 4

Multivariate analyses.

Aim 3—linear multiple regression. Linear multiple regression was used to assess whether and how much individual variables and specific blocks of variables contributed to any observed differences in quality of care between *High* and *Low AA HHAs*.

Tables 6–11 present the multiple regression results for the following three outcome variables: O2 (how often home healthcare patients got better at getting in and out of bed), O8 (how often home healthcare patients got better at taking their medications correctly by mouth), and O10 (how often home healthcare patients had to be admitted to the hospital).

We are only presenting the results in this chapter for the outcome variables that had a statistically significant difference between the means for *High* and *Low AA HHAs.* Therefore, results for outcome variable O1 (how often home health patients got better at walking or moving around), O3 (how often home healthcare patients got better at bathing), and O4 (how often home healthcare patients had less pain when moving around) were omitted from this chapter and included in the appendices.

Table 6.

Multiple Regression Results: Outcome Variable O2—How Often Home Healthcare Patients Got Better at Getting In and Out of Bed

	Variables included in the model	Parameter estimate	(SE)	95% CI	R^2 (change in R^2)
Model 1: AA serving status	Low AA status	reference group			0.0068
	High AA status	-2.64	(0.49)*	[-3.603, -1.67]	
Model 2: AA serving status + market characteristics	Low AA status	reference group			0.0069 (0.0001)
	High AA status	-2.68	(0.49)*	[-3.65, -1.71]	
	HHI	-1.8	(1.67)	[-5.06, 1.46]	
Model 3: AA serving status + market characteristics + community characteristics	Low AA status	reference group			0.0456 (0.0387)
	High AA status	-3.12	(0.51)*	[-4.11, -2.12]	
	HHI	-0.56	(1.77)	[-4.03, 2.91]	
	Percent African American Population	0.09	(0.03)*	[0.04, 0.15]	
	Per Capita Income	-0.0001	(0.00002)*	[-0.0002, -0.0001]	
	Number of unemployed persons—1st quartile (lowest)	3.24	(0.88)*	[1.51, 4.96]	
	Number of unemployed persons—2nd quartile (medium-low)	1.17	(0.67)	[-0.31, 2.48]	
	Number of unemployed persons—3rd quartile (medium-high)	0.24	(0.62)	[-0.97, 1.45]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.3	(0.05)*	[-0.39, -0.21]	
	Location—"not a statistical area"	-1.76	(0.64)*	[-3.02, -0.49]	
	Location—"Metropolitan statistical area"	-3.21	(0.51)*	[-4.21, -2.201]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	3.68	(1.87)*	[0.02, 7.33]	
	Midwest census region	1.16	(0.59)*	[0.0005, 2.31]	
	South census region	-1.69	(0.7003)*	[-3.06, 0.32]	
	West census region	reference group			
Model 4: AA serving status + market characteristics +	Low AA status	reference group			0.059 (0.0134)
	High AA status	-2.42	(0.52)*	[-3.43, -1.41]	
	HHI	-0.88	(1.77)	[-4.36, 2.59]	

	Variables included in the model	Parameter estimate	(SE)	95% CI	R^2 (change in R^2)
community characteristics + organizational characteristics	Percent African American population	0.08	(0.03)*	[0.03, 0.13]	
	Per capita income	-0.0001	(0.00002)*	[-0.0002, -0.0001]	
	Number of unemployed persons—1st quartile (lowest)	3.05	(0.88)*	[1.34, 4.77]	
	Number of unemployed persons—2nd quartile (medium-low)	1.24	(0.66)	[-0.06, 2.54]	
	Number of unemployed persons—3rd quartile (medium-high)	0.35	(0.62)	[-0.86, 1.56]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.31	(0.05)*	[-0.4, -0.22]	
	Location—"not a statistical area"	-1.75	(0.65)*	[-3.02, -0.48]	
	Location—"Metropolitan statistical area"	-2.9	(0.51)*	[-3.92, -1.89]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	3.17	(1.86)	[-0.47, 6.82]	
	Midwest census region	0.99	(0.59)	[-0.15, 2.15]	
	South census region	-1.61	(0.7)*	[-2.98, -0.24]	
	West census region	reference group			
	For-profit ownership status	1.83	(1.12)	[-0.35, 4.02]	
	Not-for-profit ownership status	3.41	(1.14)*	[1.18, 5.64]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0003	(0.0002)*	[0.00004, 0.0007]	
	Number of years HHA Medicare-certified	0.08	(0.02)*	[0.04, 0.11]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	31.63	(16.57)	[-0.85, 64.12]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	20.13	(17.01)	[-13.22, 53.48]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	32.93	(17.17)	[-0.73, 66.59]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	29.53	(16.61)	[-3.03, 62.1]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	-5.85	(33.67)	[-71.87, 60.16]	

	Variables included in the model	Parameter estimate	(SE)	95% CI	R^2 (change in R^2)
	Operating profit margin	0.02	(0.06)	[-0.09, 0.13]	
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	Low AA status	reference group			0.059 (0)
	High AA status	-2.42	(0.52)*	[-3.43, -1.41]	
	HHI	-0.85	(1.77)	[-4.33, 2.62]	
	Percent African American population	0.08	(0.02)*	[0.03, 0.13]	
	Per capita income	-0.0001	(0.00002)*	[-0.0002, -0.00007]	
	Number of unemployed persons—1st quartile (lowest)	3.01	(0.87)*	[1.29, 4.73]	
	Number of unemployed persons—2nd quartile (medium-low)	1.21	(0.66)	[-0.09, 2.51]	
	Number of unemployed persons—3rd quartile (medium-high)	0.34	(0.62)	[-0.86, 1.55]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.31	(0.05)*	[-0.39, -0.22]	
	Location—"not a statistical area"	-1.73	(0.65)*	[-3.001, -0.45]	
	Location—"Metropolitan statistical area"	-2.92	(0.52)*	[-3.93, -1.91]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	3.06	(1.86)	[-0.58, 6.702]	
	Midwest census region	0.97	(0.59)	[-0.18, 2.12]	
	South census region	-1.63	(0.69)*	[-3.001, -0.26]	
	West census region	reference group			
	For-profit ownership status	1.83	(1.12)	[-0.36, 4.01]	
	Not-for-profit ownership status	3.4	(1.14)*	[1.17, 5.63]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0004	(0.0002)*	[0.00003, 0.0008]	
	Number of years HHA Medicare-certified	0.08	(0.02)*	[0.04, 0.11]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	15.45	(14.37)	[-12.71, 43.62]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	2.26	(14.75)	[-26.66, 31.18]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	13.1	(14.89)	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			

	Variables included in the model	Parameter estimate	(SE)	95% CI	R^2 (change in R^2)
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	11.25	(14.4)	[-16.99, 39.48]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	3.19	(29.2)	[-54.05, 60.43]	
	Operating profit margin	0.02	(0.06)	[-0.09, 0.13]	
	Number FTE Aides	-0.0006	(0.003)	[-0.006, 0.005]	
	Number FTE LPNs	-0.002	(0.007)	[-0.02, 0.01]	
	Number FTE RNs	-0.003	(0.006)	[-0.02, 0.01]	

Note: AA (African American); SE (Standard Error); CI (Confidence Interval); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

Outcome variable O2 (how often home healthcare patients got better at getting in and out of bed). Model one—only *AA serving status* included in the model—was significant ($p<.0001$). The R^2 was less than 1%. The variable *High AA serving status* (high percentage of African American patients discharged in 1 year) was a statistically significant predictor of this outcome of care measure. In addition, the collective contribution of *AA serving status* variables was significant. There was one significant variable:

- *High AA serving status* (high percentage of African American patients discharged in 1 year): The parameter estimate was negative, indicating that *High AA HHAs* had a lower percentage of patients who got better at getting in and out of bed compared to *Low AA HHAs* (reference group).

Model two—the addition of *market characteristics* to the model—was significant ($p<.0001$). The R^2 was less than one percent. In this partially adjusted model, the inclusion of market characteristics increased the parameter estimate for *High AA serving status* compared to model 1, indicating they did not help explain racial differences in quality of home health care. The collective contribution of *market characteristics* to the model was not significant, indicating that the minimal change in R^2 from model one to model two was not significant. There was one significant variable:

- *High AA serving status* (high percentage of African American patients discharged in 1year): The parameter estimate was negative, indicating that *High AA HHAs* had a lower percentage of patients who got better at getting in and out of bed compared to *Low AA HHAs* (reference group).

Model three—the addition of *community characteristics* to the model—was significant ($p<.0001$). The R^2 was approximately 4.6%, an increase in R^2 of approximately 3.8 percentage

points. In this partially adjusted model, the inclusion of community characteristics increased the parameter estimate for *High AA serving status* compared to the previous model, indicating they did not help explain racial differences in quality of home health care. In addition, the collective contribution of *community characteristics* to the model was significant indicating that the change in R^2 from model two to model three was significant. There were 10 significant variables:

- *High AA serving status* (high percentage of African American patients discharged in 1year): The parameter estimate was negative, indicating that *High AA HHAs* had a lower percentage of patients who got better at getting in and out of bed compared to *Low AA HHAs* (reference group).
- *Percent African American population*: The parameter estimate was 0.09, indicating that one would expect a 0.09 increase in the percentage of patients who got better at getting in and out of bed for every one unit increase in the percentage of county population identified as African American.
- *Per capita income*: The parameter estimate was -0.0001, indicating that one would expect at 0.0001 decrease in the percentage of patients who got better at getting in and out of bed for every one unit increase in the county per capita income.
- *Number of unemployed persons—1st quartile (lowest)*: The parameter estimate was positive, indicating that HHAs located in counties with low numbers of unemployed persons had a higher percentage of patients who got better at getting in and out of bed compared to HHAs located in counties with high numbers of unemployed persons (reference group).
- *Percent of persons below poverty level*: The parameter estimate was -0.3, indicating that one would expect a 0.3 decrease in the percentage of patients who got better at getting in

and out of bed for every one unit increase in the percentage of persons below poverty level.

- *Location—"Not a statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as "not a metropolitan statistical area" had a lower percentage of patients who got better at getting in and out of bed compared to HHAs located in counties identified as a "micropolitan statistical area" (reference group).
- *Location—"Metropolitan statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as a "metropolitan statistical area" had a lower percentage of patients who got better at getting in and out of bed compared to HHAs located in counties identified as a "micropolitan statistical area" (reference group).
- *Northeast census region*: The parameter estimate was positive, indicating the HHAs located in counties the Northeast census region had a higher percentage of patients who got better at getting in and out of bed compared to HHAs located in counties in the West census region (reference group).
- *Midwest census region*: The parameter estimate was positive indicating the HHAs located in counties the Midwest census region had a higher percentage of patients who got better at getting in and out of bed compared to HHAs located in counties in the West census region (reference group).
- *South census region*: The parameter estimate was negative indicating the HHAs located in counties the South census region had a lower percentage of patients who got better at getting in and out of bed compared to HHAs located in counties in the West census region (reference group).

Model four—the addition of *organizational characteristics* to the model—was significant (p<.0001). The R^2 was approximately 5.9%, an increase in R^2 of approximately 1.4 percentage points. In this partially adjusted model, the inclusion of organizational characteristics decreased the parameter estimate for *High AA serving status* compared to the previous model, indicating they helped explain racial differences in quality of home health care. In addition, the collective contribution of *organizational characteristics* to the model was significant indicating that the change in R^2 from model three to model four was significant. There were 11 significant variables:

- *High AA serving status* (high percentage of African American patients discharged in 1year)*:* The parameter estimate was negative, indicating that *High AA HHAs* had a lower percentage of patients who got better at getting in and out of bed compared to *Low AA HHAs* (reference group).
- *Percent African American population*: The parameter estimate was 0.08, indicating that one would expect a 0.08 increase in the percentage of patients who got better at getting in and out of bed for every one unit increase in the percentage of county population identified as African American.
- *Per capita income*: The parameter estimate was -0.0001, indicating that one would expect at 0.0001 decrease in the percentage of patients who got better at getting in and out of bed for every one unit increase in the county per capita income.
- *Number of unemployed persons —1st quartile (lowest)*: The parameter estimate was positive, indicating that HHAs located in counties with low numbers of unemployed persons had a higher percentage of patients who got better at getting in and out of bed

compared to HHAs located in counties with high numbers of unemployed persons (reference group).

- *Percent of persons below poverty level*: The parameter estimate was -0.31, indicating that one would expect a 0.31 decrease in the percentage of patients who got better at getting in and out of bed for every one unit increase in the percentage of persons below poverty level.
- *Location—"Not a statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as "not a metropolitan statistical area" had a lower percentage of patients who got better at getting in and out of bed compared to HHAs located in counties identified as a "micropolitan statistical area" (reference group).
- *Location—"Metropolitan statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as a "metropolitan statistical area" had a lower percentage of patients who got better at getting in and out of bed compared to HHAs located in counties identified as a "micropolitan statistical area" (reference group).
- *Northeast census region*: The parameter estimate was positive, indicating the HHAs located in counties the Northeast census region had a higher percentage of patients who got better at getting in and out of bed compared to HHAs located in counties in the West census region (reference group).
- *South census region*: The parameter estimate was negative, indicating the HHAs located in counties the South census region had a lower percentage of patients who got better at getting in and out of bed compared to HHAs located in counties in the West census region (reference group).

- *Not-for-profit ownership status*: The parameter estimate was positive, indicating that not-for-profit HHAs had a higher percentage of patients who got better at getting in and out of bed compared to government owned HHAs (reference group).
- *Sum of total yearly patient discharges per home healthcare agency*: The parameter estimate was 0.0004, indicating that one would expect a 0.0004 increase in the percentage of patients who got better at getting in and out of bed for every 1 unit increase in the number of total yearly patient discharges per HHA.
- *Number of years agency has been Medicare-certified*: The parameter estimate was 0.08, indicating that one would expect a 0.08 increase in the percentage of patients who got better at getting in and out of bed for every 1 unit increase in the number of years an HHA was Medicare-certified.

Model five—the addition of *nurse staffing characteristics* to the model—was significant ($p<.0001$). There was no change in R^2. In this partially adjusted model, the inclusion of nurse staffing characteristics led to no change in the parameter estimate for *High AA serving status* compared to the previous model, indicating they did not help explain racial differences in quality of home health care. In addition, there was no change in the variables that were significant and the collective contribution of *nurse staffing characteristics* was not significant.

Table 7.

Summary Table: Outcome Variable O2—How Often Home Healthcare Patients Got Better at Getting In and Out of Bed

Model	R^2	Increase in R^2 from previous model
Model 1: AA serving status	0.0068	n/a
Model 2: AA serving status + market characteristics	0.0069	0.01
Model 3: AA serving status + market characteristics + community characteristics	0.0456	0.0387*
Model 4: AA serving status + market characteristics + community characteristics + organizational characteristics	0.059	0.0134*
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	0.059	0

Note: AA (African American); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model

Summary for outcome variable O2 (how often home healthcare patients got better at getting in and out of bed). For this outcome variable, model 3 (inclusion of AA serving status, market, and community characteristics) was statistically significant from model 2 (inclusion of AA serving status and market characteristics). Model 4 (inclusion of AA serving status, market, community, and organizational characteristics) was statistically significant from model 3 and was also the model that provided the overall best model fit in that it explained the largest percent of variance. Organizational characteristics were the only set of characteristics that helped to explain the observed differences in quality between *High* and *Low AA HHAs.*

Table 8.

Multiple Regression Results: Outcome Variable O8—How Often Home Healthcare Patients Got Better at Taking Their Medications Correctly by Mouth

	Variables in this model	Parameter estimate	SE	95% CI	R^2^ (change in R^2)
Model 1: AA serving status	Low AA status	reference group			0.0090
	High AA status	3.85	(0.52)*	[2.83, 4.87]	
Model 2: AA serving status + market characteristics	Low AA status	reference group			0.0117 (0.0027)
	High AA status	4.04	(0.52)*	[3.01, 5.06]	
	HHI	7.37	(1.76)*	[3.93, 10.82]	
Model 3: AA serving status + market characteristics + community characteristics	Low AA status	reference group			0.1105 (0.0988)
	High AA status	2.11	(0.44)*	[1.1, 3.13]	
	HHI	4.58	(1.81)*	[1.03, 8.12]	
	Percent African American population	0.11	(0.03)*	[0.06, 0.17]	
	Per capita income	-0.0001	(0.00002)*	[-0.0002, -0.00008]	
	Number of unemployed persons—1st quartile (lowest)	0.008	(0.89)	[-1.75, 1.77]	
	Number of unemployed persons—2nd quartile (medium-low)	-3.12	(0.68)*	[-4.46, -1.79]	
	Number of unemployed persons—3rd quartile (medium-high)	-6.83	(0.63)*	[-8.07, -5.59]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.26	(0.05)*	[-0.35, -0.17]	
	Location—"not a statistical area"	-1.29	(0.66)	[-2.59, -0.0002]	
	Location—"Metropolitan statistical area"	-7.85	(0.52)*	[-8.88, -6.83]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	4.78	(1.91)*	[1.04, 8.52]	
	Midwest census region	1.98	(0.602)*	[0.79, 3.16]	
	South census region	-0.81	(0.72)	[-0.59, 2.21]	
	West census region	reference group			
Model 4: AA serving status + market	Low AA status	reference group			0.1365 (0.026)
	High AA status	2.52	(0.52)*	[1.49, 3.54]	

	Variables in this model	Parameter estimate	SE	95% CI	R^{2}^ (change in R^{2})
characteristics + community characteristics + organizational characteristics	HHI	4.01	(1.8)*	[0.49, 7.53]	
	Percent African American population	0.09	(0.03)*	[0.04, 0.14]	
	Per capita income	-0.0001	(0.00002)*	[-0.0002, -0.00008]	
	Number of unemployed persons—1st quartile (lowest)	-0.09	(0.89)	[-1.84, 1.64]	
	Number of unemployed persons—2nd quartile (medium-low)	-2.99	(0.67)*	[-4.31, -1.67]	
	Number of unemployed persons—3rd quartile (medium-high)	-6.59	(0.62)*	[-7.81, -5.37]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.27	(0.05)*	[-0.36, -0.18]	
	Location—"not a statistical area"	-1.44	(0.66)*	[-2.73, -0.15]	
	Location—"Metropolitan statistical area"	-7.62	(0.52)*	[-8.64, -6.6]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	4.24	(1.88)*	[0.54 7.94]	
	Midwest census region	1.73	(0.6)*	[0.56, 2.89]	
	South census region	0.87	(0.71)	[-0.52, 2.26]	
	West census region	reference group			
	For-profit ownership status	7.17	(1.13)*	[4.95, 9.38]	
	Not-for-profit ownership status	5.66	(1.15)*	[3.4, 7.92]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0005	(0.0002)*	[0.0002, 0.0008]	
	Number of years HHA Medicare-certified	0.17	(0.02)*	[0.13, 0.2]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	41.63	(16.8)*	[8.69, 74.57]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	27.14	(17.25)	[-6.68, 60.97]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health Insurance	40.65	(17.41)*	[6.52, 74.78]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health Insurance	reference group			
	Percentage of discharges with both Medicare (HMO	36.42	(16.85)*	[3.39, 69.44]	

	Variables in this model	Parameter estimate	SE	95% CI	R^{2}^ (change in R^{2})
	or FFS) and Medicaid (HMO or FFS) health insurance				
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	14.34	(34.15)	[-52.6, 81.28]	
	Operating profit margin	-0.06	(0.06)	[-0.18, 0.05]	
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	Low AA status	reference group			0.1365 (0)
	High AA status	2.53	(0.52)*	[1.51, 3.56]	
	HHI	4.02	(1.8)*	[0.5, 7.55]	
	Percent African American population	0.09	(0.03)*	[0.04, 0.14]	
	Per capita income	-0.0001	(0.00002)*	[-0.0002, -0.00008]	
	Number of unemployed persons—1st quartile (lowest)	-0.12	(0.89)	[-1.87, 1.62]	
	Number of unemployed persons—2nd quartile (medium-low)	-3.03	(0.67)*	[-4.34, -1.7]	
	Number of unemployed persons—3rd quartile (medium-high)	-6.57	(0.62)*	[-7.79, -5.35]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.27	(0.05)*	[-0.36, -0.18]	
	Location—"not a statistical area"	-1.43	(0.66)*	[-2.72, 0.13]	
	Location—"Metropolitan statistical area"	-7.63	(0.52)*	[-8.65, -6.6]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	4.05	(1.88)*	[0.36, 7.75]	
	Midwest census region	1.71	(0.6)*	[0.54, 2.88]	
	South census region	0.84	(0.71)	[-0.55, 2.23]	
	West census region	reference group			
	For-profit ownership status	7.17	(1.13)*	[4.95, 9.39]	
	Not-for-profit ownership status	5.6	(1.15)*	[3.34, 7.86]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0005	(0.0002)*	[0.0001, 0.0008]	
	Number of years HHA Medicare-certified	0.16	(0.02)*	[0.13, 0.2]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	15.45	(14.37)	[-12.71, 43.62]	

	Variables in this model	Parameter estimate	SE	95% CI	R^{2}^ (change in R^{2})
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	2.26	(14.75)	[-26.66, 31.18]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health Insurance	13.1	(14.89)	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health Insurance	reference group			
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	11.25	(14.4)	[-16.99, 39.48]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	3.19	(29.2)	[-54.05, 60.43]	
	Operating profit margin	0.06	(0.06)	[-0.18, 0.06]	
	Number FTE Aides	-0.0001	(0.003)	[-0.01, 0.01]	
	Number FTE LPNs	-0.002	(0.01)	[-0.02, 0.01]	
	Number FTE RNs	0.001	(0.01)	[-0.01, 0.01]	

Note: AA (African American); SE (Standard Error); CI (Confidence Interval); * = p <.05, <.01, <.001, <.0001; R^{2} = the percentage of variance explained by all the variables included in each specific model; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

Outcome variable O8 (how often home healthcare patients got better at taking their medications correctly by mouth). Model one—the inclusion of only *AA serving status* in the model—was significant ($p<.0001$). The R^2 was less than one percent. The variable *High AA serving status* (high percentage of AA patients discharged in 1 year) was a statistically significant predictor of this outcome of care measure. The parameter estimate was positive (in contrast to parameter estimates for *High AA serving status* for the other three variables discussed previously), indicating the *Low AA HHAs* had poorer outcomes compared to *High AA HHAs*. The collective contribution of *AA serving status* variables was significant. There was one significant variable:

- *High AA serving status* (high percentage of AA discharges in 1 year): The parameter estimate was positive, indicating that *High AA HHAs* had a higher percentage of patients who got better at taking medications by mouth compared to *Low AA HHAs* (reference group).

Model two—the addition of *market characteristics* to the model—was significant ($p<.0001$). The R^2 was approximately 1.1%. In this partially adjusted model, the inclusion of market characteristics increased the parameter estimate for *High AA serving status* compared to model 1, indicating they did not help to explain racial differences in quality of home health care. The collective contribution of *market characteristics* to the model was significant, indicating that the slight increase in R^2 from model one to model two was significant. There were two significant variables:

- *High AA serving status* (high percentage of AA discharges in 1 year): The parameter estimate was positive, indicating that *High AA HHAs* had a higher percentage of patients

who got better at taking medications by mouth compared to *Low AA HHAs* (reference group).

- *HHI* (Herfindahl index: sum of squared market shares of all HHAs in county): The parameter estimate was 7.37, indicating that one would expect a 7.37 increase in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the Herfindahl index.

Model three—the addition of *community characteristics* to the model—was significant ($p<.0001$). The R^2 was 11%, an increase in R^2 of nearly 10 percentage points. In this partially adjusted model, the inclusion of community characteristics decreased the parameter estimate for *High AA serving status* compared to the previous model, indicating they helped explain racial differences in quality of home health care. The collective contribution of *community characteristics* to the model was significant, indicating that the change in R^2 from model two to model three was significant. There were 10 variables with significant parameter estimates:

- *High AA serving status* (high percentage of AA discharges in 1 year): The parameter estimate was positive, indicating that *High AA HHAs* had a higher percentage of patients who got better at taking medications by mouth compared to *Low AA HHAs* (reference group).
- *HHI* (Herfindahl index: sum of squared market shares of all HHAs in county): The parameter estimate was 4.58, indicating that one would expect a 4.58 increase in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the Herfindahl index.
- *Percent African American population*: The parameter estimate was 0.11, indicating that one would expect a 0.11 increase in the percentage of patients who got better at taking

medications by mouth for every 1 unit increase in the percentage of county population identified as African American.

- *Per capita income*: The parameter estimate was -0.0001, indicating that one would expect a 0.0001 decrease in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the county per capita income.
- *Number of unemployed persons—2nd quartile (medium low)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-low number of unemployed persons had a lower percentage of patients who got better at taking medications by mouth compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Number of unemployed persons—3rd quartile (medium high)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-high number of unemployed persons had a lower percentage of patients who got better at taking medications by mouth compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Percent of persons below poverty level*: The parameter estimate was -0.26, indicating that one would expect a 0.26 decrease in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the percentage of persons below poverty level.
- *Location—"Metropolitan statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as a "metropolitan statistical area" had a lower percentage of patients who got better at taking medications by mouth

compared to HHAs located in counties identified as a "micropolitan statistical area" (reference group)

- *Northeast census region*: The parameter estimate was positive, indicating that HHAs located in counties in the Northeast had a higher percentage of patients who got better a taking medications by mouth compared to HHAs located in counties in the West (reference group).
- *Midwest census region*: The parameter estimate was positive, indicating that HHAs located in counties in the Midwest had a higher percentage of patients who got better a taking medications by mouth compared to HHAs located in counties in the West (reference group).

Model four—the addition of *organizational characteristics* to the model—was significant ($p<.0001$). The R^2 was 13.6%, an increase in R^2 of 2.6 percentage points. In this partially adjusted model, the inclusion of organizational characteristics decreased the parameter estimate for *High AA serving status* compared to the previous model, indicating they helped explain racial differences in quality of home health care. The collective contribution of *organizational characteristics* to the model was significant, indicating that the change in R^2 from model three to model four was significant. There were 18 variables with significant parameter estimates:

- *High AA serving status* (high percentage of AA discharges in 1 year): The parameter estimate was positive, indicating that *High AA HHAs* had a higher percentage of patients who got better at taking medications by mouth compared to *Low AA HHAs* (reference group).
- *HHI* (Herfindahl index: sum of squared market shares of all HHAs in county): The parameter estimate was 4.02, indicating that one would expect a 4.02 increase in the

percentage of patients who got better at taking medications by mouth for every 1 unit increase in the Herfindahl index.

- *Percent African American population*: The parameter estimate was 0.09, indicating that one would expect a 0.09 increase in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the percentage of county population identified as African American.
- *Per capita income*: The parameter estimate was -0.0001, indicating that one would expect a 0.0001 decrease in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the county per capita income.
- *Number of unemployed persons—2nd quartile (medium low)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-low number of unemployed persons had a lower percentage of patients who got better at taking medications by mouth compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Number of unemployed persons—3rd quartile (medium high)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-high number of unemployed persons had a lower percentage of patients who got better at taking medications by mouth compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Percent of persons below poverty level*: The parameter estimate was -0.27, indicating that one would expect a 0.27 decrease in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the percentage of persons below poverty level.

- *Location—"Not a statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as "not a statistical area" had a lower percentage of patients who got better a taking medications by mouth compared to HHAs located in counties identified as a "micropolitan statistical area" (reference group).
- *Location—"Metropolitan statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as a "metropolitan statistical area" had a lower percentage of patients who got better at taking medications by mouth compared to HHAs located in counties identified as a "micropolitan statistical area" (reference group)
- *Northeast census region*: The parameter estimate was positive, indicating that HHAs located in counties in the Northeast had a higher percentage of patients who got better a taking medications by mouth compared to HHAs located in counties in the West (reference group).
- *Midwest census region*: The parameter estimate was positive, indicating that HHAs located in counties in the Midwest had a higher percentage of patients who got better a taking medications by mouth compared to HHAs located in counties in the West (reference group).
- *For-profit ownership status*: The parameter estimate was positive, indicating that for-profit HHAs had a higher percentage of patients who got better a taking medications by mouth compared to government-owned HHAs (reference group).
- *Not-for-profit ownership status*: The parameter estimate was positive, indicating that not-for-profit HHAs had a higher percentage of patients who got better a taking medications by mouth compared to government-owned HHAs (reference group).

- *Sum of total yearly patient discharges per home healthcare agency*: The parameter estimate was 0.0005, indicating that one would expect an increase of 0.0005 in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the total number of yearly patient discharges per HHA.
- *Number of years HHA Medicare-certified*: The parameter estimate was 0.16, indicating that one would expect a 0.16 increase in the percentage of patients who got better at taking medications by mouth for every 1 unit increase in the number of years an agency was Medicare-certified.
- *Percentage of patients discharged in 1year who have Medicare HMO or Medicare FFS insurance* ("Medicare only"): The parameter estimate was positive, indicating the HHAs with a higher percentage of "Medicare only" patients had more patients who got better at taking medications by mouth compared to HHAs with a higher percentage of patients discharged in 1 year who have Medicaid HMO or Medicaid FFS and one other type of non-Medicare health insurance (reference group).
- *Percentage of patients discharged in 1 year who have Medicare HMO/Medicare FFS and another type of health insurance* ("Medicare—other"): The parameter estimate was positive, indicating the HHAs with a higher percentage of "Medicare—other" patients had more patients who got better at taking medications by mouth compared to HHAs with a higher percentage of patients discharged in 1 year who have Medicaid HMO or Medicaid FFS and one other type of non-Medicare health insurance (reference group).
- *Percentage of patients discharged in 1 year who have Medicare HMO/Medicare FFS and Medicaid HMO/Medicaid FFS* ("Dual"): The parameter estimate was positive, indicating the HHAs with a higher percentage of 'Dual" patients had more patients who got better at

taking medications by mouth compared to HHAs with a higher percentage of patients discharged in 1 year who have Medicaid HMO or Medicaid FFS and one other type of non-Medicare health insurance (reference group).

Model five—the addition of *nurse staffing characteristics* to the model—was not significant (p<.0001). There was no change in the R^2. In this partially adjusted model, the inclusion of nurse staffing characteristics increased the parameter estimate for *High AA serving status* compared to the previous model, indicating they did not help explain racial differences in quality of home health care. There were no changes in the variables with significant parameter estimates and the collective contribution of *nurse staffing characteristics* to the model was not significant.

Table 9.

Summary Table: Outcome Variable O8—How Often Home Healthcare Patients Got Better at Taking Their Medications Correctly by Mouth

Model	R^2	Change in R^2 from previous model
Model 1: AA serving status	0.0090	n/a
Model 2: AA serving status + market characteristics	0.0117	0.0027*
Model 3: AA serving status + market characteristics + community characteristics	0.1105	0.0988*
Model 4: AA serving status + market characteristics + community characteristics + organizational characteristics	0.1365	0.026*
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	0.1365	0

Note: AA (African American); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model

Summary for outcome variable O8 (how often home healthcare patients got better at taking their medications by mouth). For this outcome variable, model 2 (inclusion of AA serving status and market characteristics) was statistically significant from model 1 (inclusion of AA

serving status only). Model 3 (inclusion of AA serving status, market, and community characteristics) was statistically significant from model 2. Model 4 (inclusion of AA serving status, market, community, and organizational characteristics) was statistically significant from model 3 and was also the model that provided the overall best model fit in that it explained the largest percent of variance. Community and organizational characteristics were the only sets of characteristics that helped to explain the observed differences in quality between *High* and *Low AA HHAs.*

Table 10.

Multiple Regression Results: Outcome Variable O10—How Often Home Healthcare Patients Had to Be Admitted to the Hospital

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
Model 1: AA serving status	Low AA status	reference group			0.0174
	High AA status	1.9	(0.29)*	[1.32, 2.49]	
Model 2: AA serving status + market characteristics	Low AA status	reference group			0.0322 (0.0148)
	High AA status	2.15	(0.29)*	[1.56, 2.73]	
	HHI	9.82	(0.99)*	[7.86, 11.77]	
Model 3: AA serving status + market characteristics + community characteristics	Low AA status	reference group			0.0590 (0.0268)
	High AA status	1.76	(0.3)*	[1.16, 2.35]	
	HHI	8.29	(1.06)*	[6.2, 10.37]	
	Percent African American population	0.02	(0.02)	[-0.01, 0.05]	
	Per capita income	-0.00002	(0.0001)	[-0.00005, 0.00001]	
	Number of unemployed persons—1st quartile (lowest)	-2.61	(0.53)*	[-3.65, -1.58]	
	Number of unemployed persons—2nd quartile (medium-low)	-1.9	(0.4)*	[-2.69, -1.12]	
	Number of unemployed persons—3rd quartile (medium-high)	-3.82	(0.37)*	[-4.56, -3.1]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.01	(0.03)	[-0.07, 0.04]	
	Location—"not a statistical area"	-0.46	(0.39)	[-1.23, 0.3]	
	Location—"Metropolitan statistical area"	-1.49	(0.31)*	[-2.1, -0.89]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	-0.74	(1.12)	[-2.93, 1.46]	
	Midwest census region	-0.16	(0.35)	[-0.86, 0.53]	
	South census region	0.24	(0.42)	[-0.59, 1.1]	
	West census region	reference group			
Model 4: AA serving status + market characteristics +	Low AA status	reference group			0.1224 (0.0634)
	High AA status	1.29	(0.3)*	[0.69, 1.88]	
	HHI	6.71	(1.04)*	[4.67, 8.74]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
community characteristics + organizational characteristics	Percent African American population	0.02	(0.02)	[-0.01, 0.05]	
	Per capita income	-0.00001	(0.00001)	[-0.00004, 0.00001]	
	Number of unemployed persons—1st quartile (lowest)	-2.87	(0.51)*	[-3.88, -1.87]	
	Number of unemployed persons—2nd quartile (medium-low)	-2.23	(0.39)*	[-2.99, -1.47]	
	Number of unemployed persons—3rd quartile (medium-high)	-3.59	(0.36)*	[-4.29, -2.88]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.007	(0.03)	[-0.06, 0.05]	
	Location—"not a statistical area"	-0.07	(0.38)	[-0.82, 0.67]	
	Location—"Metropolitan statistical area"	-1.59	(0.3)*	[-2.18, -0.99]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	-0.97	(1.09)	[-3.1, 1.16]	
	Midwest census region	-0.39	(0.34)	[-1.06, 0.28]	
	South census region	0.47	(0.41)	[-0.33, 1.27]	
	West census region	reference group			
	For-profit ownership status	0.63	(0.65)	[-0.65, 1.91]	
	Not-for-profit ownership status	-1.68	(0.67)*	[-2.99, -0.38]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	-0.0005	(0.0001)*	[-0.0007, -0.0003]	
	Number of years HHA Medicare-certified	0.05	(0.01)*	[0.03, 0.07]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	35.7	(9.7)*	[-54.71, -16.68]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	-13.84	(9.96)	[-33.36, 5.69]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	-37.1	(10.05)*	[-56.77, -17.37]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare	-36.18	(9.72)*	[-55.24, -17.12]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
	(HMO or FFS) and Medicaid (HMO or FFS) health insurance				
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	-24.52	(19.71)	[-63.15, 14.12]	
	Operating profit margin	0.02	(0.03)	[-0.05, 0.09]	
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	Low AA status	reference group			0.1229 (0.0005)
	High AA status	1.29	(0.3)*	[0.7, 1.89]	
	HHI	6.68	(1.04)*	[4.65, 8.71]	
	Percent African American population	0.02	(0.02)	[-0.01, 0.05]	
	Per capita income	-0.00001	(0.00001)	[-0.00004, 0.00001]	
	Number of unemployed persons—1st quartile (lowest)	-2.83	(0.51)*	[-3.83, -1.81]	
	Number of unemployed persons—2nd quartile (medium-low)	-2.19	(0.39)*	[-2.95, 1.43]	
	Number of unemployed persons—3rd quartile (medium-high)	-3.58	(0.36)*	[-4.29, -2.87]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.01	(0.03)	[-0.06, 0.04]	
	Location—"not a statistical area"	-0.1	(0.38)	[-0.85, 0.65]	
	Location—"Metropolitan statistical area"	-1.57	(0.3)*	[-2.16, 0.98]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	-0.84	(1.09)	[-2.97, 1.29]	
	Midwest census region	-0.36	(0.34)	[-1.04, 0.31]	
	South census region	0.5	(0.41)	[-0.3, 1.3]	
	West census region	reference group			
	For-profit ownership status	0.63	(0.65)	[-0.65, 1.91]	
	Not-for-profit ownership status	-1.68	(0.67)*	[-2.99, -0.38]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	-0.0005	(0.0001)*	[-0.001, -0.0003]	
	Number of years HHA Medicare-certified	0.048	(0.01)*	[0.03, 0.07]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	15.45	(14.37)	[-12.71, 43.62]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	2.26	(14.75)	[-26.66, 31.18]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	13.1	(14.89)	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	11.25	(14.4)	[-16.99, 39.48]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	3.19	(29.2)	[-54.05, 60.43]	
	Operating profit margin	0.02	(0.03)	[-0.04, 0.09]	
	Number FTE Aides	0.002	(0.002)	[-0.001, 0.01]	
	Number FTE LPNs	0.0007	(0.004)	[-0.01, 0.01]	
	Number FTE RNs	0.004	(0.004)	[-0.03, 0.01]	

Note: AA (African American); SE (Standard Error); CI (Confidence Interval); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurses

Outcome variable O10 (how often home healthcare patients had to be admitted to the hospital). Model one—the inclusion of only *AA serving status* in the model—was significant (p<.0001). The R^2 was approximately 1.7%. The variable *High AA serving status* (high percentage of AA patients discharged in 1 year) was a statistically significant predictor of this outcome of care measure. The parameter estimate was positive and demonstrated *High AA HHAs* had poorer quality of care because, for this measure only, lower scores indicated higher quality. The collective contribution of *AA serving status* variables was significant. There was one significant variable:

- *High AA serving status* (high percentage of AA patient discharges in 1 year): The parameter estimate was positive, indicating that *High AA HHAs* had more patients who had to be admitted to the hospital compared to *Low AA HHAs* (reference group).

Model two—the addition of *market characteristics* to the model—was significant (p<.0001). The R^2 was 3.2%, an increase in R^2 of 1.5 percentage points. In this partially adjusted model, the inclusion of market characteristics increased the parameter estimate for *High AA serving status* compared to model 1, indicating they did not help explain racial differences in quality of home health care. The collective contribution of *market characteristics* to the model was significant, indicating that the slight increase in R^2 from model one to model two was significant. There were two variables with significant parameter estimates:

- *High AA serving status* (high percentage of AA patient discharges in 1 year): The parameter estimate was positive, indicating that *High AA HHAs* had more patients who had to be admitted to the hospital compared to *Low AA HHAs* (reference group).
- *HHI* (Herfindahl index: sum of squared market shares of all HHAs in county): The parameter estimate was 9.82, indicating that one would expect a 9.82 increase in the

percentage of patients admitted to the hospital for every 1 unit increase in the Herfindahl index.

Model three—the addition of *community characteristics* to the model—was significant ($p<.0001$). The R^2 was approximately 5.9%, an increase in R^2 of 2.7 percentage points. In this partially adjusted model, the inclusion of community characteristics decreased the parameter estimate for *High AA serving status* compared to the previous model, indicating they helped explain racial differences in quality of home health care. The collective contribution of *community characteristics* to the model was significant, indicating that the change in R^2 from model two to model three was significant. There were six variables with significant parameter estimates:

- *High AA serving status* (high percentage of AA patient discharges in 1 year): The parameter estimate was positive, indicating *High AA HHAs* had more patients who had to be admitted to the hospital compared to *Low AA HHAs* (reference group).
- *HHI* (Herfindahl index: sum of squared market shares of all HHAs in county): The parameter estimate was 8.29, indicating that one would expect an 8.29 increase in the percentage of patients admitted to the hospital for every 1 unit increase in the Herfindahl index.
- *Number of unemployed persons—1st quartile (lowest)*: The parameter estimate was negative, indicating that HHAs located in counties with a low number of unemployed persons had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties with the highest number of unemployed persons (reference group).

- *Number of unemployed persons—2nd quartile (medium-low)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-low number of unemployed persons had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Number of unemployed persons—3rd quartile (medium-high)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-high number of unemployed persons had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Location—"Metropolitan statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as a "metropolitan statistical area" had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties identified as "micropolitan statistical area" (reference group).

Model four—the addition of *organizational characteristics* to the model—was significant ($p<.0001$). The R^2 was approximately 12.2%, an increase in R^2 of 6.3 percentage points. In this partially adjusted model, the inclusion of organizational characteristics decreased the parameter estimate for *High AA serving status* compared to the previous model, indicating they helped explain racial differences in quality of home health care. The collective contribution of *organizational characteristics* to the model was significant, indicating that the change in R^2 from model three to model four was significant. There were 12 variables with significant parameter estimates:

- *High AA serving status* (high percentage of AA patient discharges in 1 year): The parameter estimate was positive, indicating that *High AA HHAs* had more patients who had to be admitted to the hospital compared to *Low AA HHAs* (reference group).
- *HHI* (Herfindahl index: sum of squared market shares of all HHAs in county): The parameter estimate was 6.71, indicating that one would expect a 6.71 increase in the percentage of patients admitted to the hospital for every 1 unit increase in the Herfindahl index.
- *Number of unemployed persons—1st quartile (lowest)*: The parameter estimate was negative, indicating that HHAs located in counties with a low number of unemployed persons had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Number of unemployed persons—2nd quartile (medium-low)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-low number of unemployed persons had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties with the highest number of unemployed persons (reference group).
- *Number of unemployed persons—3rd quartile (medium-high)*: The parameter estimate was negative, indicating that HHAs located in counties with a medium-high number of unemployed persons had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties with the highest number of unemployed persons (reference group).

- *Location—"Metropolitan statistical area:"* The parameter estimate was negative, indicating that HHAs located in counties identified as a "metropolitan statistical area" had a lower percentage of patients who were admitted to the hospital compared to HHAs located in counties identified as "micropolitan statistical area" (reference group).
- *Not-for-profit ownership status*: The parameter estimate was negative, indicating that not-for-profit HHAs had a lower number of patients who were admitted to the hospital compared to government-owned HHAs (reference group).
- *Sum of total yearly patient discharges per home healthcare agency*: The parameter estimate was -0.0005, indicating that one would expect a decrease of 0.0005 in the percentage of patients who had to be admitted to the hospital for every 1 unit increase in the total number of yearly patient discharges per HHA.
- *Number of years HHA Medicare-certified*: The parameter estimate was 0.05, indicating that one would expect a 0.05 increase in the percentage of patients who got had to be admitted to the hospital for every 1 unit increase in the number of years an agency was Medicare-certified.
- *Percentage of patients discharged in 1year who have Medicare HMO or Medicare FFS insurance* ("Medicare only"): The parameter estimate was negative indicating the HHAs with a higher percentage of "Medicare only" patients had fewer patients who had to be admitted to the hospital compared to HHAs with a higher percentage of patients discharged in 1 year who have Medicaid HMO or Medicaid FFS and one other type of non-Medicare health insurance (reference group).
- *Percentage of patients discharged in 1 year who have Medicare HMO/Medicare FFS and another type of health insurance* ("Medicare—other"): The parameter estimate was

negative, indicating the HHAs with a higher percentage of "Medicare—other" patients had fewer patients who had to be admitted to the hospital compared to HHAs with a higher percentage of patients discharged in 1 year who have Medicaid HMO or Medicaid FFS and one other type of non-Medicare health insurance (reference group).

- *Percentage of patients discharged in 1 year who have Medicare HMO/Medicare FFS and Medicaid HMO/Medicaid FFS* ("Dual"): The parameter estimate was negative, indicating the HHAs with a higher percentage of "Dual" patients had fewer patients who had to be admitted to the hospital compared to HHAs with a higher percentage of patients discharged in 1 year who have Medicaid HMO or Medicaid FFS and one other type of non-Medicare health insurance (reference group).

Model five—the addition of *nurse staffing characteristics* to the model—was significant ($p<.0001$). There was a negligible in the R^2. In this partially adjusted model, the inclusion of nurse staffing characteristics led to no change in the parameter estimate for *High AA serving status* compared to the previous model, indicating they did not help explain racial differences in quality of home health care. There were no changes in the variables with significant parameter estimates and the collective contribution of *nurse staffing characteristics* to the model was not significant.

Table 11.

Summary Table: Outcome Variable O10—How Often Home Healthcare Patients Had to Be Admitted to the Hospital

Model	R^2	Change in R^2 from previous model
Model 1: AA serving status	0.0174	n/a
Model 2: AA serving status + market characteristics	0.0322	0.0148*
Model 3: AA serving status + market characteristics + community characteristics	0.0590	0.0268*
Model 4: AA serving status + market characteristics + community characteristics + organizational characteristics	0.1224	0.0634*
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	0.1229	0.0005

Note: AA (African American); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model

Summary for outcome variable O10 (how often home healthcare patients had to be hospitalized). For this outcome variable, model 2 (inclusion of AA serving status and market characteristics) was statistically significant from model 1 (inclusion of AA serving status only). Model 3 (inclusion of AA serving status, market, and community characteristics) was statistically significant from model 2. Model 4 (inclusion of AA serving status, market, community, and organizational characteristics) was statistically significant from model 3 and was also the model that provided the overall best model fit in that it explained the largest percent of variance. Community and organizational characteristics were the only sets of characteristics that helped to explain the observed differences in quality between *High* and *Low AA HHAs.*

Aim 4—logistic regression. Logistic regression was used to determine which factors (market, community, organizational, and nurse staffing) predicted quality of care in *High AA HHAs*.

Tables 12–15 present the results of the logistic regression for three of the six outcome variables: O3 (how often home healthcare patients got better at bathing), O4 (how often home

healthcare patients had less pain when moving around) and O10 (how often home healthcare patients had to be admitted to the hospital).

Results for outcome variables O1 (how often home health patients got better at walking or moving around), O2 (how often home healthcare patients got better at getting in and out of bed), and O8 (how often home healthcare patients got better at taking their medications correctly by mouth) were not included in this chapter (included in Appendices). They were similar to the results for variable O3 (how often home healthcare patients got better at bathing) and O4 (how often home healthcare patients had less pain when moving around) in that the same general picture emerged from all of the models. Outcome variable O10 (how often home healthcare patients had to be admitted to the hospital) is discussed in the chapter because the results varied somewhat from the other outcome variables and this outcome variable is the one most often discussed in the home healthcare quality of care literature because of the current focus on preventing hospitalizations and re-admissions after discharge following hospitalization.

Table 12.

Logistic Regression Results: Outcome Variable O3—How Often Home Healthcare Patients Got Better at Bathing

Variables	Parameter Estimate	Wald χ^2 test	Odds ratio	95% CI
Market characteristics				
HHI	-1.52	1.74	0.22	[0.02, 2.09]
Community characteristics				
Percent African American	-0.005	0.19	0.99	[0.97, 1.02]
Per capita income	-0.00001	1.15	1.00	[1.00, 1.00]
Number of unemployed persons—1st quartile (lowest)	-0.19	0.37	0.83	[0.45, 1.53]
Number of unemployed persons—2nd quartile (medium-low)	-0.52	3.17	0.59	[0.33, 1.05]
Number of unemployed persons—3rd quartile (medium-high)	-0.34	1.52	0.71	[0.41, 1.23]
Number of unemployed persons—4th quartile (highest)	Reference group			
Persons (%) below poverty level	-0.05	4.17*	0.96	[0.91, 0.99]
Location—"not a statistical area"	0.29	1.11	1.34	[0.78, 2.32]
Location—"Metropolitan statistical area"	-0.21	0.60	0.81	[0.48, 1.38]
Location—"Micropolitan statistical area"	Reference group			
Organizational characteristics				
For-profit ownership status	0.49	0.39	1.63	[0.36, 7.42]
Not-for-profit ownership status	-0.04	0.003	0.96	[0.18, 5.05]
Government-owned ownership status	Reference group			
Total yearly discharges per HHA	0.00009	0.58	1.00	[1.00, 1.00]
Number of years HHA Medicare-certified	-0.02	6.57*	0.98	[0.96, 0.99]
Percentage of discharges with only Medicare (HMO or FFS) health insurance	3.15	14.66*	23.39	[4.66, 117.53]
Percentage of discharges with only Medicaid (HMO or FFS) health insurance	Reference group			
Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	3.21	7.95*	24.71	[2.66, 229.71]
Operating profit margin	0.07	1.82	1.07	[0.97, 1.19]
Nurse staffing characteristics				
Number FTE Aides	0.003	1.03	1.00	[0.99, 1.01]
Number FTE LPNs	-0.02	1.05	0.98	[0.95, 1.02]
Number FTE RNs	-0.0003	0.04	1.00	[0.99, 1.00]

Note: * = p <.05, <.01, <.001, <.0001; Odds ratio is probability of High AA HHA being high quality; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

Outcome variable O3 (how often home healthcare patients got better at bathing): The likelihood ratio chi-square (χ^2) test of the full model with all 19 predictors against a constant-only model was statistically significant (p <.0001). This indicated that the full model, with all predictors, fit the data significantly better than a constant-only model.

According to the Wald criterion, there were four significant variables, with these four variables being the only ones (for this model) that reliably predicted quality:

- *Percent of persons below poverty level*: A 1 unit increase in the percentage of persons in poverty was associated with a 1 unit lower likelihood of being identified as high-quality.
- *Number of years HHA Medicare-certified*: A 1 unit increase in the number of years an agency was Medicare-certified was associated with a 1 unit lower likelihood of being identified as high-quality.
- *Percentage of patients discharged in 1year who have Medicare HMO or Medicare FFS insurance* ("Medicare only"): HHAs with a higher percentage of "Medicare only" patients were 23.4 times as likely to be identified as high-quality as HHAs with a higher percentage of patients who have Medicaid only.
- *Percentage of patients discharged in 1year who have both Medicare HMO/FFS and Medicaid HMO/FFS* ("Dual"): HHAs with a higher percentage of "Dual" patients were 24.71 times as likely to be identified as high-quality as HHAs with a higher percentage of patients who have Medicaid only.

Table 13.

Logistic Regression Results: Outcome Variable O4—How Often Home Healthcare Patients Had Less Pain When Moving Around

Variables	Parameter Estimate	Wald χ^2 test	Odds ratio	95% CI
Market characteristics				
HHI	-1.12	1.23	0.33	[0.05, 2.36]
Community characteristics				
Percent African American	-0.006	0.28	0.99	[0.97, 1.02]
Per capita income	0.00001	1.74	1.00	[1.00, 1.00]
Number of unemployed persons—1st quartile (lowest)	0.59	3.33	1.79	[0.96, 3.38]
Number of unemployed persons—2nd quartile (medium-low)	0.05	0.03	1.05	[0.59, 1.88]
Number of unemployed persons—3rd quartile (medium-high)	0.13	0.21	1.14	[0.65, 1.98]
Number of unemployed persons—4th quartile (highest)	Reference group			
Persons (%) below poverty level	-0.01	0.24	0.99	[0.94, 1.03]
Location—"not a statistical area"	-0.29	1.16	0.75	[0.44, 1.27]
Location—"Metropolitan statistical area"	-0.45	2.69	0.64	[0.37, 1.09]
Location—"Micropolitan statistical area"	Reference group			
Organizational characteristics				
For-profit ownership status	-0.56	0.83	0.57	[0.17, 1.89]
Not-for-profit ownership status	-0.54	0.62	0.58	[0.15, 2.23]
Government-owned ownership status	Reference group			
Total yearly discharges per HHA	-0.0002	1.73	1.00	[0.99, 1.00]
Number of years HHA Medicare-certified	-0.03	15.01*	0.97	[0.95, 0.98]
Percentage of discharges with only Medicare (HMO or FFS) health insurance	3.29	15.63*	26.74	[5.24, 136.37]
Percentage of discharges with only Medicaid (HMO or FFS) health insurance	Reference group			
Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	3.64	10.46*	37.97	[4.19, 344.18]
Operating profit margin	-0.02	0.51	0.97	[0.92, 1.04]
Nurse staffing characteristics				
Number FTE Aides	0.003	0.49	1.00	[0.99, 1.01]
Number FTE LPNs	0.007	1.53	1.01	[0.99, 1.02]
Number FTE RNs	0.0005	0.06	1.00	[0.99, 1.00]

Note: * = p <.05, <.01, <.001, <.0001; Odds ratio is probability of High AA HHA being high quality; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

Outcome variable O4 (how often home healthcare patients had less pain when moving around): The likelihood ratio chi-square (χ^2) test of the full model with all 19 predictors against a constant-only model was statistically significant (p <.0001). This indicated that the full model, with all predictors, fit the data significantly better than a constant-only model.

According to the Wald criterion, there were three significant variables, with these three variables being the only ones (for this model) that reliably predicted quality:

- *Number of years HHA Medicare-certified*: A 1 unit increase in the number of years an agency was Medicare-certified was associated with a 1 unit lower likelihood of being identified as high-quality.
- *Percentage of patients discharged in 1year who have Medicare HMO or Medicare FFS insurance* ("Medicare only): HHAs with a higher percentage of "Medicare only" patients were 26.74 times as likely to be identified as high-quality as HHAs with a higher percentage of patients who have Medicaid only.
- *Percentage of patients discharged in 1year who have both Medicare HMO/FFS and Medicaid HMO/FFS* ("Dual"): HHAs with a higher percentage of "Dual" patients were 37.97 times as likely to be identified as high-quality as HHAs with a higher percentage of patients who have Medicaid only.

Table 14.

Logistic Regression Results: Outcome Variable O10—How Often Home Healthcare Patients Had to Be Admitted to the Hospital

Variables	Parameter Estimate	Wald χ^2 test	Odds ratio	95% CI
Market characteristics				
HHI	-2.89	4.78*	0.06	[0.004, 0.74]
Community characteristics				
Percent African American	0.02	2.76	1.02	[0.99, 1.04]
Per capita income	6.29E-6	0.41	1.00	[1.00, 1.00]
Number of unemployed persons—1st quartile (lowest)	-0.14	0.17	0.87	[0.46, 1.67]
Number of unemployed persons—2nd quartile (medium-low)	0.13	0.18	1.14	[0.62, 2.1]
Number of unemployed persons—3rd quartile (medium-high)	0.57	3.64	1.77	[0.98, 3.19]
Number of unemployed persons—4th quartile (highest)	Reference group			
Persons (%) below poverty level	-0.03	1.94	0.97	[0.92, 1.01]
Location—"not a statistical area"	0.67	4.91*	1.96	[1.08, 3.54]
Location—"Metropolitan statistical area"	0.27	0.81	1.31	[0.73, 2.38]
Location—"Micropolitan statistical area"	Reference group			
Organizational characteristics				
For-profit ownership status	-0.57	0.64	0.56	[0.14, 2.31]
Not-for-profit ownership status	-0.44	0.30	0.64	[0.13, 3.12]
Government-owned ownership status	Reference group			
Total yearly discharges per HHA	0.0002	3.05	1.00	[1.00, 1.00]
Number of years HHA Medicare-certified	-0.08	50.12*	0.93	[0.91, 0.95]
Percentage of discharges with only Medicare (HMO or FFS) health insurance	3.36	14.45*	28.85	[5.09, 163.31]
Percentage of discharges with only Medicaid (HMO or FFS) health insurance	Reference group			
Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	2.49	3.86*	12.09	[1.01, 145.02]
Operating profit margin	0.01	0.16	1.01	[0.97, 1.05]
Nurse staffing characteristics				
Number FTE Aides	0.003	0.35	1.00	[0.99, 1.01]
Number FTE LPNs	-0.06	5.59*	0.94	[0.9, 0.99]
Number FTE RNs	0.002	1.19	1.00	[0.99, 1.00]

Note: * = p <.05, <.01, <.001, <.0001; Odds ratio is probability of High AA HHA being high quality; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

Outcome variable O10 (how often home healthcare patients had to be admitted to the hospital): The likelihood ratio chi-square (χ^2) test of the full model with all 19 predictors against a constant-only model was statistically significant (p <.0001). This indicated that the full model, with all predictors, fit the data significantly better than a constant-only model.

According to the Wald criterion, there were six significant variables, with these six variables being the only ones (for this model) that reliably predicted quality:

- *HHI* (Herfindahl index: sum of squared market shares of all HHAs in county): A 1 unit increase in the HHI was associated with a 1 unit lower likelihood of being identified as high-quality.
- *Location—"Not a statistical area:"* HHAs located in counties identified as "not a statistical area" were 1.96 times as likely to be identified as high-quality as HHAs located in counties identified as a "micropolitan statistical area."
- *Number of years HHA Medicare-certified*: A 1 unit increase in the number of years an HHA was Medicare-certified was associated with a 1 unit lower likelihood of being identified as high-quality.
- *Percentage of patients discharged in 1year who have Medicare HMO or Medicare FFS insurance* ("Medicare only"): HHAs with a higher percentage of "Medicare only" patients were 28.85 times as likely to be identified as high-quality as HHAs with a higher percentage of patients who have Medicaid only.
- *Percentage of patients discharged in 1year who have both Medicare HMO/FFS and Medicaid HMO/FFS* ("Dual"): HHAs with a higher percentage of "Dual" patients were 12.09 times as likely to be identified as high-quality as HHAs with a higher percentage of patients who have Medicaid only.

- *Number of FTE Licensed Practical Nurses*: A 1 unit increase in the number of FTE LPNs was associated with a 1 unit lower likelihood of being identified as high-quality.

Table 15. Aim 4 Summary Table: Logistic Regression Results

Outcome variable	Model fit was statistically significant*	Variables that reliably predicted quality
O3: how often home healthcare patients got better at bathing	✓	Poverty level, Agency age, Medicare only, Dual
O4: how often home healthcare patients had less pain when moving around	✓	Agency age, Medicare only, Dual
O10: how often home healthcare patients had to be admitted to the hospital	✓	HHI, Location (not a statistical area), Agency age, Medicare only, Dual, Number of FTE LPNs

Note: LPN=Licensed Practical Nurse; FTE=full-time equivalent; HHI=Herfindahl-Hirschman Index; * = $p < .05$, <.01, <.001, <.0001; ✓= yes.

Aim 4 summary. We found that for all three of the outcome variables discussed above, the full model with all 19 predictors was statistically significant, indicating each model fit the data better than a constant-only model. In other words for each model, the predictors, as a set, reliably distinguished between high and low quality High AA HHAs better than a constant-only model. In addition, for all three models, organizational characteristics, specifically "agency age", "Medicare only", and "Dual" reliably predicted high quality of care.

Summary

This chapter presented the results of the statistical analyses used to complete this study. The study samples used for each aim were described and the results for each of the four aims were discussed. The final chapter of the dissertation will discuss these findings, describe implications of the findings, and make recommendations for future research.

CHAPTER 6: DISCUSSION

Introduction

The purposes of this study were to: determine whether there were racial differences in the quality of home health care between *High AA HHAs* and *Low AA HHAs* and to examine the relationships between market, community, organizational, and nurse staffing characteristics and differences in the quality of home health care. The theory of institutional racism guided this study and the specific variables included in the conceptual model (grouped by characteristic: market, community, organizational, and nurse staffing) reflect various types and sources of institutional racism. The study also compared patient demographic characteristics in *High AA HHAs* to those in *Low AA HHAs*. Finally, the study examined variation in quality among *High AA HHAs* and identified which specific factors (market, community, organizational, or nurse staffing) differentiated low-quality and high-quality *High AA HHAs*.

This chapter begins with a brief discussion of the guiding theory and is subsequently organized by aim. Results from the previous chapter are summarized, interpreted, and explained. Implications of the findings are discussed. The chapter concludes with a description of the limitations of the study and suggestions for future research.

Institutional Racism

There are many studies that have identified racial disparities in the quality of health care, but far fewer have taken the next step and begun to identify potential underlying causes of racial disparities. A theory can serve as a useful guide in helping the researcher identify concepts that might be important in understanding the potential causes of racial differences in the quality of

home health care. Ultimately, identifying and understanding the underlying causes of racial differences in the quality of home health care will help healthcare organizations, policy makers, and researchers design and implement interventions that have a greater chance of reducing or eliminating such racial differences. This study was guided by the theory of institutional racism.

The theory of institutional racism states that policies and practices of social institutions, regardless of intentionality, can result in racial inequality for African Americans (and other minority groups) (Better, 2008; Feagin & Feagin, 1986; Ture & Hamilton, 1992). Much disparities research has focused on micro-level causes of disparities, such as provider-level causes, and has neglected potential macro-level causes such as the role of social institutions (Griffith et al., 2007). The theory of institutional racism provides a way for researchers to examine institutional racism at the macro level; that is, an initial identification and understanding of which policies and practices of social institutions might contribute to racial differences in the quality of home health care.

In this study, policies and practices of social institutions are thought to influence the social institution of health care, contributing to differences in the quality of care between *High* and *Low AA HHAs* (Better, 2008). The variables (grouped by characteristic—market, community, organizational, and nurse staffing) included in the conceptual model used for this study reflect various types and sources of institutional racism that stem from the policies and practices of a variety of social institutions.

Aim 1

Despite a significant body of evidence demonstrating racial disparities in one type of long-term care—nursing home care—there is limited evidence of such disparities in a different type of long term care—home health care. Although reporting of standardized home healthcare

quality of care measures is mandated by the CMS, it is likely based on research from other types of healthcare organizations such as hospitals and nursing homes that quality of care varies across home healthcare agencies and differences in quality of care also exist between home healthcare agencies (Hasnain-Wynia et al., 2010; Jha et al., 2007; Konetzka & Werner, 2009; Smedley et al., 2003; Smith et al., 2007).

Understanding the patient population at home healthcare agencies that serve a high percentage of African American patients and those that serve a low percentage of African American patients is an important first step in determining if differences exist between these two types of home healthcare agencies. To date there are no published studies in which home healthcare patient demographic characteristics of *High AA HHAs* are compared to those of *Low AA HHAs*. Thus, the first aim of this study was to describe and compare patient demographic characteristics of *High AA HHAs* and *Low AA HHAs*.

Racial Makeup of Home Healthcare Agencies

The findings of this study suggest that, similar to nursing homes and other healthcare organizations, African American patients and white patients receive their care from different home healthcare agencies (Hasnain-Wynia et al., 2007; Jha et al., 2007; Smith et al., 2007). In this study, we found that *Low AA HHAs* served few African American patients—only 1% of their discharges were African American (74% of patients served were white) whereas *High AA HHAs* served a higher percentage of White patients—32% of their discharges were white (58% of their patients were African American). The question that needs to be asked and answered then is whether or not—and more importantly why—racial differences in quality of care exist between the two groups of agencies.

Age, Length of Stay, and Health Status

This study also provided evidence that *High AA HHAs* served a younger (68.8 years compared to 75.5 years) and less healthy population and that their patients had significantly longer lengths of stay (144 days compared to 83 days) compared to *Low AA HHAs*. Several other studies have shown that African American patients who use home health care tend to be younger and sicker than White users of home health care (Brega et al., 2005). The same differences between African American and White patients in terms of health status have been found in nursing homes and hospitals (Joynt et al., 2011; Mor et al., 2004; Popescu et al., 2007). The available disparities literature provides some possible explanations for the apparent differences in health status between African American and White users of home health care: disparities in access to care and disparities in quality of care once care is accessed.

Access to quality health care for the African American population has long been a challenge in the United States. These challenges in accessing care have, in part, led to higher morbidity and mortality rates for African Americans (Cooke et al., 2011; Joynt et al., 2011; Popescu et al., 2007). Though recent changes to the health system such as those put in place by the Affordable Care Act have improved access to care, there are still many, especially those in poor households who are often members of a minority group, who do not have adequate access to health care (AHRQ, 2015). In addition, once care is accessed, African Americans continue to receive care that is of lower quality than the care provided to White patients (AHRQ, 2015; Lopez & Jha, 2013). Although there have been across-the-board gains in both access and quality of care, these gains have not led to a decrease in disparities because they have "lifted the whole boat" instead of being targeted to African American (and other minority) patients. Overall access and quality has improved, but the same disparities still persist (AHRQ, 2015).

Patient Insurance

Data from this study indicated that in both *High AA HHAs* and *Low AA HHAs* the vast majority of home health care was paid for by Medicare (85% or greater for all home healthcare agencies) whereas 8% of patients of *High AA HHAs* and 6% of patients of *Low AA HHAs* had Medicaid as a payer for their home healthcare services. This is not surprising given the fact that Medicare typically pays for home healthcare services—often shorter-term post-acute services—whereas Medicaid typically pays for nursing home care, which tends to be for long-term services.

Medicare payments for home health care are based on the prospective payment system: Home healthcare agencies are paid a predetermined base rate for each 60-day episode of care for each patient (CMS, 2015b). This base payment rate is adjusted based on health condition of the patient and on geographic location of the patient, not the home healthcare agency (CMS, 2015b). Further, payments for patients who receive fewer than four visits are made on a per visit basis and are not subject to price adjustments (i.e., home healthcare agencies are paid for the cost of care) (MedPAC, 2015). Payments for patients who are considered to be outliers (patients who need care beyond the 60-day episode of care) are paid differently (CMS, 2015b). Once a patient has gone beyond the initial 60-day episode of care, additional outlier payments might be made to the home healthcare agency, depending on whether or not episode costs exceed the 60-day episode payment rate by a specific amount that is determined each year by the CMS (MedPAC, 2015). If eligible for the outlier payment, the HHA essentially receives payment equal to 80% of the cost of care (MedPAC, 2015).

This study has shown that African American users of home health care are more likely to be sicker and are therefore more likely to require more intense services compared to White users of home health care. Thus, depending on case mix and the number of patients who are high or

low users of home health care, *High AA HHAs* and *Low AA HHAs* might receive different amounts of income from Medicare for their services. If a *High AA HHA* has a significant percentage of patients who are considered outliers, then those agencies are not receiving the full payment amount for services provided. In comparison, if a *Low AA HHA* has a significant percentage of patients who are low users of home health care (four visits or less) then they are getting paid on a per visit basis (i.e., the actual cost of care), not a predetermined rate (MedPAC, 2015). Therefore, *High AA HHAs* that rely heavily on Medicare for payment still might be resource poor, depending on the health status of the population served and whether or not Medicare payments are adequately covering the actual costs of care.

Aim 2

Several decades of disparities research have shown that disparities in quality of care exist in several types of healthcare organizations, including hospitals, outpatient clinics, and nursing homes (Hasnain-Wynia et al., 2010; Konetzka & Werner, 2009; Varkey et al., 2009). Recent research has indicated that African American and White patients receive their care from different healthcare organizations; that these organizations are highly segregated; and that healthcare organizations that serve a high percentage of African American patients have poorer quality of care compared to those that serve a lower percentage of African American patients (Hasnain-Wynia et al., 2010; Jha et al., 2007; Mor et al., 2004; Smith et al., 2007). Further, studies have shown that the problem of disparities in quality of care is a problem for *all* patients of organizations that serve a high percentage of African American patients, not just those patients who are African American (Hasnain-Wynia et al., 2010; Lopez & Jha, 2013).

In terms of home health care, this study has provided initial evidence that, similar to other healthcare organizations, *High* and *Low AA HHAs* serve significantly different populations. An

important next step then is to identify whether or not differences exist between home healthcare agencies that serve a high percentage of African American patients and those that serve a low percentage of African American patients. Thus, the second aim of this study was to compare quality of care in *High AA HHAs* to *Low AA HHAs* using the CMS-mandated quality of care outcome measures. Equally important to identifying whether or not racial differences in quality of care exist is determining factors that might contribute to any observed racial differences in quality of care (Aim 3 of this study). Therefore, a secondary part of this aim was to describe and compare the market, community, organizational, and nurse staffing characteristics of home healthcare agencies—factors that potentially contribute to differences in quality of home health care.

Quality of Care Outcome Indicators

Quality of care can be measured several ways. Donabedian (1988) proposed three interrelated dimensions that can be used to examine quality of care: structure, process, and outcomes. For this study, outcomes of care were chosen as the way to measure quality of care for three important reasons: the majority of disparities research that is focused on disparities between high- and low-minority-serving organizations uses outcomes to measure quality; there are standardized quality of care outcome measures, required by the CMS, for all Medicare- and/or Medicaid-certified home healthcare agencies; and the three available home healthcare studies that have identified disparities in care (either at the patient or agency level) used the CMS quality of care outcome measures (Brega et al., 2005; Peng et al., 2003; Towne, et al., 2015). In addition, most outcome of care measures are typically static measures (e.g., a specific immunization given or not), which do not assess improvement or decline in patient health status. However, for this study, the outcome of care measures were measures of change (e.g.,

improvement in bathing or taking medication) and therefore did provide better evidence of improvement or decline in patient health status.

This study provided mixed evidence that differences in quality of home health care exist between *High AA HHAs* and *Low AA HHAs*. There were six outcome of care measures used in this study. For two of the six measures (O2: how often patients got better at getting in and out of bed and O10: how often patients had to be admitted to the hospital) *High AA HHAs* had lower quality of care compared to *Low AA HHAs*. For one outcome of care measure, (O8: how often patients got better at taking their medications correctly by mouth), *Low AA HHAs* had lower quality of care compared to *High AA HHAs.* Finally, for the three remaining outcome of care measures (O1: how often patients got better at walking or moving around and O3: how often patients got better at bathing, and O4: how often patients had less pain when moving around), there were no differences in quality of care between *High* and *Low AA HHAs.*

The findings of this study are consistent with a recent study that found mixed evidence of disparities in quality of care between home healthcare agencies that served an area with a higher population of Native American/Alaskan Native (NA/AN) persons compared to home healthcare agencies that served an area with a lower population of NA/AN persons (Towne et al., 2015). The researchers found differences in care for 9 of the 12 Home Health Compare outcome of care indicators that were used in the study. Similar mixed results have also been found in studies that have examined differences in quality of care between high and low minority-serving hospitals, nursing homes, and outpatient clinics (Jha et al., 2007; Lopez & Jha, 2013; Smith et al., 2007; Varkey et al., 2009). For example, Hasnain-Wynia et al. (2010) recently examined Hospital Quality Alliance (HQA) measures and found evidence for disparities in close to 40% of the measures. In addition, Jha and colleagues (2007) examined differences in quality of care between

hospitals that served a high percentage of elderly African American patients and those that served a low percentage of elderly African American patients. They also used the HQA measures (they created composite scores for congestive heart failure, pneumonia, and acute myocardial infarction) and found evidence for disparities in one of the three measures (33%), a similar proportion to what was found in other studies comparing high and low minority-serving healthcare organizations.

Market Characteristics

Research on the effect of competition (the only market characteristic included in this study) on disparities in quality of long-term care has been limited and mixed. It is thought that *High AA HHAs* are likely located in markets that have fewer home healthcare agencies and are, therefore, not in competitive markets. Thus, there is little incentive for these agencies to provide quality of care that is above the minimum needed to remain Medicare/Medicaid-certified (Zinn, Aaronson, & Rosko, 1993).

For this study, the Herfindahl-Hirschman Index was used to measure competition. We found evidence that *High AA HHAs* were located in more highly competitive markets compared to *Low AA HHAs*. This finding is in contrast to a recent study by Li et al (2011) that found that nursing homes that served a high percentage of African American patients were more likely to be located in less competitive markets compared to nursing homes that served a lower percentage of African American patients. In addition, though the difference in the means of the Herfindahl index between *High* and *Low AA HHAs* was statistically significant, it was small and likely has little practical significance.

The market for *High AA HHAs* might be more competitive than the market for nursing homes that serve a high percentage of African American patients. It is unclear whether or not African American patients are more likely to use home health care compared to nursing home

care (Peng et al., 2003). If African American patients tend to use home health care at higher rates than nursing home care, then it is possible that there are more home healthcare agencies that serve African American patients (i.e., more *High AA HHAs*) in any given market because there are more patients to serve. When there are more agencies in a market, there is a higher level of competition between the agencies within that market because those agencies have to compete for a finite number of home healthcare patients. *High AA HHAs* in more competitive markets might be compelled to improve their quality of care as a way to attract more patients, or they might place their focus elsewhere—for example, on expanding in size so that they can serve more patients and increase revenue.

Community Characteristics

There is a significant body of research that has suggested that *High AA* healthcare organizations are located in communities that have a high minority (and low White) population, are resource-poor, have a lower per capita income, a higher proportion of residents living in poverty, and limited employment opportunities (Mor et al., 2004; Miller et al., 2006). It is likely that absent necessary resources, *High AA HHAs* in poor communities with a high minority (and low White) population are likely to struggle to provide high-quality care to their patients, a factor that could contribute to differences in quality of home health care.

Data from this study indicated *High AA HHAs* were located in counties with different profiles from *Low AA* HHAs. *High AA HHAs* were located in counties with a higher African American population and lower White population compared to *Low AA HHAs*. The counties with *High AA HHAs* also had a significantly higher average number of unemployed persons (19,285 persons compared to 5,290 persons) compared to *Low AA HHAs*. Interestingly, *High AA HHAs* were more likely to be located in counties labeled as "not a statistical area" (i.e., rural) compared

to *Low AA HHAs*. *High AA HHAs* were also more likely to be located in the South and less likely to be located in the West than *Low AA HHAs*.

Taken together, these findings indicate that *High AA HHAs* are located in areas that are more resource-poor than *Low AA HHAs*. They are also consistent with other studies that have shown that healthcare organizations that serve a high percentage of African American patients tend to be located in counties that have fewer resources (Miller et al., 2006; Smith et al., 2007; Towne et al., 2015). Thus, it is possible that this lack of outside resources might affect *High AA HHAs*, such as inhibiting their ability to find and hire adequately trained and educated staff.

Organizational Characteristics

Several studies have shown that organizational characteristics such as profit status have contributed to disparities in quality of care between *High* and *Low AA nursing homes* (Mor et al., 2004; Miller et al., 2006). For example, for-profit nursing homes might choose to distribute a higher percentage of profits to investors rather than invest in improving the quality of care at the nursing home, thus leading to disparities in care between *High* and *Low AA nursing homes* (Popescu, Werner, Vaughan-Sarrazin, & Cram, 2009). If *High AA HHAs* are more likely to be for-profit, it is possible that these agencies might also be less likely to invest in improving quality of care and thus provide poorer quality of care compared to home healthcare agencies that are not-for-profit. Other organizational characteristics such as agency age, profit margin, and number of Medicaid patients might also contribute to differences in quality of care by limiting revenue earned by home healthcare agencies. With limited financial resources, *High AA HHAs* might be unable to provide the necessary level of care, and thus quality of care may be poorer at these agencies.

Findings from this study suggest that *High AA HHAs* differ from *Low AA HHAs* in terms of certain organizational characteristics. *High AA HHAs* had a positive average operating margin

compared to *Low AA HHAs*, which had a negative average operating margin (a negative profit margin is possible when operating expenses exceed revenue). A larger percentage of *High AA HHAs* were under for-profit ownership compared to *Low AA HHAs*. *High AA HHAs* have also been Medicare- and/or Medicaid-certified for fewer years (an average of 11 compared to an average of 16 for *Low AA HHAs*). They also had a larger percentage of Medicare-only patients (90% compared to 88%) and a larger percentage of Medicaid-only patients (5% compared to 4%) compared to *Low AA HHAs* and *High AA HHAs* had longer average lengths of stay (125 days compared to 79 days).

Healthcare organizations that serve a high percentage of African American patients have been shown to differ in terms of organizational characteristics compared to those organizations that serve a low percentage of African American patients (Brooks-Carthon et al., 2011; Jha et al., 2007; Rose et al., 2012). Similar to the effect of community characteristics, organizational characteristics are also thought to have an effect on resources for healthcare organizations (Castle & Engberg, 2008). In this study we found that *High AA HHAs* do have a slightly higher operating profit margin and that they are more likely to be for-profit. For-profit organizations (whether they are home healthcare agencies or another type of organization) need to maximize profits so that they can distribute any surplus to their shareholders (Haldiman & Tzeng, 2010; Smith et al., 2008). Although studies have shown that for-profit healthcare organizations such as hospitals and nursing homes provide poorer quality of care, no recent studies have shown that the same holds true for home healthcare agencies (Grabowski et al., 2009; Hillmer et al., 2005; Smith et al., 2008). However, none of these studies have focused on *High* and *Low AA HHAs* and thus it is unclear whether or not for-profit *High AA HHAs* might operate differently. For example, for-profit home health *High AA HHAs* might spend less money on nursing care or other

improvement efforts such as electronic medical records in an effort to raise profits for shareholders. Also, as discussed under Aim 1, longer lengths of stay might adversely affect home healthcare agencies in that they might not get fully reimbursed for care provided. If this is the case, then *High AA HHAs* would have less revenue to put into projects such as quality improvement initiatives.

Nurse Staffing Characteristics

A stable, well-trained nursing staff is essential for the delivery of high-quality care in HHAs (Stone, 2004). *High AA nursing homes* are characterized by low RN staffing levels and poor quality of care (Mor et al., 2004; Miller et al., 2006; Smith et al., 2007). If *High AA HHAs* also have low RN staffing levels (and also low LPN and NA staffing levels), they might not be able to provide the appropriate level of care for their patients. In addition, *High AA HHAs* might not have the resources to pay their nursing staff competitively and might not be able to attract or retain well-qualified nursing staff, thus contributing to lower levels of staffing or greater turnover, factors known to negatively influence quality of care (Castle & Engberg, 2007). Finally, nursing staff in *High AA HHAs* likely face challenges that other home healthcare agency nursing staff might not face, due to providing care to a sicker and needier population and to providing care in communities that are often poor and characterized by challenges such as inadequate housing and high rates of crime (Olson, 2010). Challenges such as these could make it difficult for *High AA HHAs* to hire and retain well-qualified nursing staff, thus contributing to differences in quality of home health care.

Recent studies of other types of healthcare organizations (i.e., hospitals, nursing homes) have shown that organizations that serve a high percentage of African American (or minority) patients have fewer registered nurses and aides (Jha et al., 2007; Smith et al., 2007). However, results of this study indicated that there was no difference in the number of FTE registered nurses

between *High* and *Low AA HHAs*. In addition, results also indicated that there was no difference between the means of FTE licensed practical nurses for *High* and *Low AA HHAs* or between the means of FTE aides for *High* and *Low AA HHAs*.

Home health care is organized differently from hospitals and nursing homes. Home healthcare nurses and aides go to the homes of patients to provide care. Home health care is also more holistic in that a team of providers is often providing care to patients. Home healthcare patients are often receiving services from more than one type of provider. Indeed, results from this study indicated that all home healthcare agencies, regardless of racial makeup, provide a variety of services to their patients. Thus, it is possible that this team effort means that no one specialty is more prevalent than another.

Aim 3

Findings from this study have provided mixed evidence of racial differences in the quality of home health care. It is important to note that the differences in observed outcomes of care in the current study are *between agency* differences as opposed to *within agency* differences. *Within agency* differences are, for example, when patient outcomes within the same agency differ by race, gender, socioeconomic status, or some other measure. *Between agency* differences are when the aggregate agency outcomes differ. Outcomes in this study were measured and subsequently compared at the agency level and the findings provided evidence of differences between agencies rather than within agencies. Such findings suggest that the problem of racial differences, at least for home healthcare agencies and based on evidence from this study, is at the agency level and affects *all* patients of *High AA HHAs* rather than only African American patients of *High AA HHAs*.

To identify and develop interventions that will be successful in reducing or eliminating racial differences in quality of home health care, it is important to understand the factors that might be contributing to racial differences in quality of home health care. Therefore, a necessary next step for this study was to identify which factors might contribute to these observed racial differences in quality of care. In this study, there were six outcome of care measures that were used to measure quality of home health care. Differences in quality between *High* and *Low AA HHAs* were found for two of the six measures (O2: how often patients got better at getting in and out of bed and O10: how often patients had to be admitted to the hospital).

Home healthcare quality is affected by a complex group of characteristics. Thus, the third aim of the study was to assess whether and which market, community, organizational, and nurse staffing characteristics individually and together account for differences in quality of care provided to patients of *High and Low AA HHAs*. Therefore, the rest of the section will focus on groups of characteristics that were found to account for observed differences in quality of care for each of these two outcome measures.

However, prior to discussing factors that contributed to differences in quality of care, it is equally important to note that there were three outcome of care measures (O1: how often patients got better at walking or moving around; O3: how often patients got better at bathing; and O4: how often patients had less pain when moving around) on which *High* and *Low AA HHAs* did not differ and one outcome of care measure (O8: how often patients got better at taking their medications correctly by mouth) on which *Low AA HHAs* had lower quality of care scores compared to *High AA HHAs*.

It is possible that the two groups differed at baseline—in other words, that *Low AA HHA* patients were better at walking, better at bathing, and knew more about correctly taking meds

upon admission to the home healthcare agency compared to *High AA HHA* patients. Then, if there was less improvement for the *Low AA HHA* patients compared to *High AA HHA* patients, the quality of care outcome scores would indicate that there either were no differences between the two types of agencies or that *Low AA HHAs* had lower quality of care outcome scores compared to *High AA HHAs*. Unfortunately, it was not possible to evaluate baseline differences because of the inclusion and exclusion criteria used in the study design. Patients who were discharged from the home healthcare agency in 2010 were included in the sample, but those same patients did not have to be admitted during 2010 (i.e., their admission date could have been during 2010 or earlier) and therefore we did not have baseline data (included in admission data only) for all patients. It was noted previously that the outcome of care measures used in this study were measures of change (e.g., improvement in bathing) as opposed to static measures of quality (e.g., smoking cessation counseling provided at discharge). Thus, it is also possible that home healthcare agencies are good at helping patients improve their functional status, regardless of underlying health condition, and thus fewer differences were found between *High* and *Low AA HHAs*.

Outcome Variable O2: How Often Home Healthcare Patients Got Better at Getting In and Out of Bed

The findings from the third aim have shown that the percentage of African American home healthcare patients was a significant predictor of how often home healthcare patients got better at getting in and out of bed. That is, *High AA HHAs* performed more poorly on this measure compared to *Low AA HHAs*. These differences were partially, though not fully, explained by organizational characteristics. Market, community, and nurse staffing characteristics did not help to explain differences in quality of care between *High* and *Low AA HHAs*.

Outcome Variable O10: How Often Home Healthcare Patients Had to be Admitted to the Hospital

The percentage of African American home healthcare patients was also a significant predictor of how often home healthcare patients had to be admitted to the hospital. As with the previously discussed outcome measure, *High AA HHAs* performed more poorly on this measure compared to *Low AA HHAs*. These differences were partially, though not fully, explained by community and organizational characteristics. Market and nurse staffing characteristics did not help to explain differences in quality of care between *High* and *Low AA HHAs*.

Market and Nurse Staffing Characteristics

For both quality of care measures (O2 and O10), market and nurse staffing characteristics did not help explain differences in quality of care between *High* and *Low AA HHAs*. The relationship between competition (the only market characteristics included in this study) and quality of care has not been studied in home healthcare agencies, but there are nursing home studies that have indirectly examined the effect of market competition on quality of care. The results of these studies have been mixed, so it is difficult to accurately predict the effect of competition on home healthcare quality of care (Grabowski, et al., 2004; Intrator et al., 2007; Li et al., 2011). Thus, the finding from this aim that indicated competition did not reduce differences in quality of care between *High* and *Low AA HHAs* was not surprising. It might be that alternative measures of competition would be more useful when examining differences in quality of care between *High* and *Low AA HHAs* or that other measures of market characteristics, such as county nurse supply, are needed. Given that home healthcare agencies operate differently than other healthcare organizations (i.e., home healthcare providers go to the patients and patients are typically referred to a home healthcare agency rather than making an active decision to choose a home healthcare agency) it is possible that home healthcare agencies "compete" for

patients in markets that are different than the markets where the actual agency is located. For example, a home healthcare agency might be located in County A, but the hospital that does the majority of its referrals is in County B. Thus, the effect of market competition for the HHA might actually be in County B instead of County A.

In contrast, the literature from long-term healthcare organizations demonstrates that nurse staffing does have an effect on quality of care (Castle & Engberg, 2007; Mor et al., 2004; Miller et al., 2006; Smith et al., 2007; Stone, 2004). In addition, Brooks-Carthon and colleagues (2011) recently examined the relationship between quality of care and nurse staffing in hospitals with a high percentage of African American patients. In this study they found that nurse staffing levels did help partially explain observed differences between hospitals that serve a high percentage of African American patients and those that serve a low percentage of African American patients.

It seems unlikely, given the large volume of literature that supports the importance of nurse staffing levels and long-term care quality of care, that nurse staffing levels have no effect on the quality of home health care or differences in quality between *High* and *Low AA HHAs*. One possible reason for this finding might have been the way nurse staffing was measured for this study. It is possible that it is not just the number of full-time nurse (RN and LPN) and nurse's aide positions but the combination of those positions (i.e., what was the effect on quality of having few RNs and a higher number of aides or vice versa) and other factors such as stability, rates of turnover, and use of agency nurses. Each of these factors has been shown to affect nursing home quality of care (Castle & Engberg, 2007) and it is possible that these factors might also have some influence on home healthcare quality of care.

Community and Organizational Characteristics

The Institute of Medicine (IOM), in its landmark report on disparities in quality of care, identified several potential sources of disparities in quality of care including systemic factors,

patient-level factors, and process-level factors (Smedley et al., 2003). Since this report, disparities research has largely focused on process-level factors—including the effect of physician biases and stereotyping. The relationship between systemic factors such as the geographic location of healthcare organizations and disparities in quality of care has been examined with less frequency, but this has been changing in the past few years.

Disparities researchers have recently been examining the idea that a majority of African American (and other minority) patients receive care from healthcare organizations that are different from those that serve a majority of White patients (Baicker, Chandra, Skinner, & Wennberg, 2004; Hasnain-Wynia et al., 2007; Jha et al., 2007). There have been several studies of hospitals and nursing homes that have examined the effect of both the organizations themselves (i.e., services provided, providers) and the location of the organizations (i.e., racial residential segregation, percent of county population in poverty) on disparities in quality of care (Baicker et al., 2004; Hasnain-Wynia et al., 2007; Jha et al., 2007; Miller et al., 2006; Smith et al., 2007). Findings from this study indicate that differences in quality of care between *High* and *Low AA HHAs* are due, in part, to community and organizational characteristics.

A range of community characteristics were examined in this study and, collectively, were found to influence racial differences in the quality of home health care. Percent African American population, per capita income, number unemployed, location, census region, and percent of population below the poverty level were some of the variables included in the community characteristics that were examined in this study. Findings from this study were consistent with other studies that have examined the influence of community characteristics on racial differences in the quality of nursing home care. Factors such as percent African American population, census region, and percent below the poverty level have been shown to influence

disparities in the quality of care in studies of nursing homes that serve a high percentage of African American patients compared to those that serve a low percentage of African American patients (Miller et al., 2006; Smith et al., 2007).

In this study, *High AA HHAs* were more likely to be located in communities with a higher African American (and lower White) population compared to *Low AA HHAs*. They were also shown to be located in counties with a lower per capita income, higher rate of unemployment, and higher percent of population living below the poverty level—all indications that the communities are resource-poor. Communities that have a high minority (and low White) population tend to have fewer organizations that provide medical equipment and other supplies, making it difficult for home healthcare staff to secure necessary equipment and supplies (Olson, 2010). In addition, poor communities with a high minority (and low White) population are often characterized by a lack of other medical facilities and healthcare organizations. This makes linkages between healthcare organizations difficult and possibly contributes to poor coordination of care, a crucial component of quality home health care. Therefore, there are likely fewer resources available that enable home healthcare staff to provide care that is often essential to help home health patients achieve the level of independence that is needed to continue to live in their homes (Mor et al., 2004; Olson, 2010).

Organizational characteristics such as profit status, percent Medicare and percent Medicaid, size, and number of years Medicare-certified were among the characteristics examined in this study. Although community characteristics were found to influence findings for one of the two outcome variables, organizational characteristics, collectively, were found to influence both outcome variables. Findings from this study were similar to other studies that have examined racial disparities in the quality of nursing home care (Miller et al., 2006; Chisholm et al., 2013).

Percent Medicaid patients, profit status, and size have all been found to influence racial disparities in the quality of nursing home care (Chisholm et al., 2013; Miller et al., 2006).

For-profit status has been linked to poorer quality of care (Mor et al., 2004; Miller et al., 2006) and *High AA HHAs* are more likely to be for-profit compared to *Low AA HHAs*. It is possible that for-profit *High AA HHAs* might choose to distribute a higher percentage of profits to investors rather than invest in improving quality of care, thus leading to differences in care between *High* and *Low AA NHs* (Popescu et al., 2009). In addition, although system membership (i.e., membership in a healthcare organization chain) was not investigated as part of this study, it is possible that for-profit home healthcare agencies are more likely to be part of a chain. If this is true, higher-level management decisions might be made not to invest additional funds in quality of care improvements in home healthcare agencies that serve low-income patients or in home healthcare agencies that are located in poorer communities.

High AA HHAs also serve fewer patients compared to *Low AA HHAs*. It is possible that agency revenue is lower, and thus the agency may face difficult choices as to how to allocate its limited financial resources. Smaller organizations also tend to have more difficulty raising needed capital, which would also contribute to resource constraints (Baum, 1997). In this study it has also been shown that *High AA HHAs* provide care to a population that is sicker and likely in need of more intensive services. With limited financial resources, *High AA HHAs* might be unable to provide the necessary level of care, and thus this might be another reason why quality of care may be poorer at these agencies compared to *Low AA HHAs*.

Aim 3 Summary

Findings from this study indicate the importance of examining the influence of community and organizational characteristics on differences in the quality of home health care. However, it should be noted that community and organizational characteristics did not fully

reduce the effect of percent African American patients on the quality of home health care. This is an indication that although community and organizational characteristics are important, there are likely numerous other factors that influence racial differences in the quality of home health care. In addition, it is still unclear *how* these characteristics influence racial differences in quality of home health care. Thus, although identification of these community and organizational characteristics is an important first step, further study is needed to identify which specific characteristics influence racial differences in home health care and to understand how the pathways by which they influence racial differences.

Aim 4

This study has shown that there are some differences between *High AA HHAs* and *Low AA HHAs* in terms of quality of care and other factors such as specific market, community, and organizational characteristics noted previously in this chapter. *High AA HHAs* likely face unique pressures that *Low AA HHAs* do not face. Although this study has shown that *High* and *Low AA HHAs* are significantly different and that community and organizational characteristics influence racial differences between *High* and *Low AA HHAs*, it is likely that there is variation within *High AA HHAs* in terms of quality of care. Understanding how some *High AA HHAs* manage to provide high quality of care while facing significant challenges that are unique to *AA-serving HHAs* can help researchers and policy makers design more effective interventions aimed at reducing or eliminating differences in quality of home health care. Thus, the final aim of this study was to examine the variation in quality among *High AA HHAs* and identify the factors (market, community, organizational, nurse staffing) that differentiate high- and low-quality *High AA HHAs*.

Outcome Variable O3: How Often Home Healthcare Patients Got Better at Bathing

The findings from the fourth aim have shown that four of the 19 predictors reliably predicted quality of care for this outcome of care measure. An increase in the percent of persons below the poverty level was associated with a decreased likelihood of a *High AA HHA* being high-quality. In addition, an increase in the number of years Medicare-certified was associated with a decreased likelihood of a *High AA HHA* being high-quality. Also, an increase in the percent of patients with Medicare was associated with an increased likelihood of a *High AA HHA* being high-quality. Similarly, an increase in the percent of patients considered "Duals" (have both Medicare and Medicaid) was associated with an increased likelihood of a *High AA HHA* being high-quality.

Outcome Variable O4: How Often Home Healthcare Patients Had Less Pain When Moving Around

The findings from the fourth aim have shown that, for outcome variable O4, three of the 19 predictors reliably predicted quality of care. For this outcome of care measure, an increase in the number of years Medicare-certified was associated with a decreased likelihood of a *High AA HHA* being high-quality. Also, an increase in the percent of patients with Medicare was associated with an increased likelihood of a *High AA HHA* being high-quality. Finally, an increase in the percent of patients considered "Duals" (have both Medicare and Medicaid) was associated with an increased likelihood of a *High AA HHA* being high-quality.

Outcome Variable O10: How Often Home Healthcare Patients Had to be Admitted to the Hospital

The findings from the fourth aim have shown that six of the 19 predictors of quality of care reliably predicted quality of care for this outcome of care measure. An increase in the Herfindahl-Hirschman Index (i.e., a decrease in competition) was associated with a decreased likelihood of a *High AA HHA* being high-quality. An HHA being located in an area labeled "not

a statistical area" was associated with an increased likelihood of a *High AA HHA* being high-quality. An increase in the number of years Medicare-certified was associated with a decreased likelihood of a *High AA HHA* being high-quality. Also, an increase in the percent of patients with Medicare was associated with an increased likelihood of a *High AA HHA* being high-quality. Similarly, an increase in the percent of patients considered "Duals" (have both Medicare and Medicaid) was associated with an increased likelihood of a *High AA HHA* being high-quality. Finally, an increase in the number of LPNs was associated with a decreased likelihood of a *High AA HHA* being high-quality.

Characteristics that Differentiated High- and Low-Quality *High AA HHAs*

Findings from the fourth aim of this study are in line with other research on minority-serving healthcare organizations that suggests site of care and organizational resources play important roles in racial differences in quality of care (Lopez & Jha, 2013; Mor et al., 2004). Although this research has not examined variation in quality of care in minority-serving healthcare organizations, it would not be unusual to have the same factors that influence racial differences in quality of care also have an effect on variation in quality of care among *High AA HHAs*.

In this study, *High AA HHAs* with a higher percentage of Medicare patients and those with a higher percentage of patients with both Medicare and Medicaid ("duals") were more likely to be high-quality. Because Medicare pays a higher rate than Medicaid (Grabowski & Angelelli, 2004; Mor et al., 2004), it is possible that *High AA HHAs* with a higher percentage of Medicare patients have more revenue and are able to put some of this revenue toward improving quality of care. Interestingly, *High AA HHAs* that were "older" (Medicare-certified for more years) were more likely to be poor quality compared to those that were "younger." It is possible that this was because younger *High AA HHAs* were more innovative in terms of their use of

limited resources. They may have needed to distinguish themselves in an already crowded market and show they are on the cutting edge and one way to do so would be to tout high-quality care compared to other agencies in the same market, especially given healthcare's increased focus on quality improvement (Baum, 1997). In addition, older *High AA HHAs* might be more likely to be established in a market and not see the need to improve quality of care scores so long as they meet benchmarks mandated by the CMS.

Market, community, and nurse staffing characteristics had less influence on variation in quality of care among *High AA HHAs* compared to organizational characteristics. It is possible that different market, community, and nurse staffing characteristics need to be examined. For example, a single nurse staffing characteristic (number of full-time equivalent RNs, LPNs, and NAs) was examined for this aim. Home health care agencies typically have a variety of providers (i.e., physical therapist, speech therapist) and different patients are visited by different providers based on the needs of the patient. Other providers likely have as much (or more) influence on racial differences in quality of care as nurses and should therefore be included in any future studies. There are also other nursing factors that might be important such as use of agency nurses (or LPNs or NAs) or rates of turnover of nurses.

Home health care is unique in that patients do not receive care at the physical location of the home healthcare agency but rather (for the vast majority of patients) in their homes. In addition, home healthcare agencies are located in one area and their patients in other areas (possibly different counties) and thus characteristics of both where the agency is located and where the patient is located need to be examined. Also, home-life factors (i.e., housing or neighborhood stability, presence or absence of caregivers) are likely to contribute more to quality

of care for home health care than they do to care from other healthcare organizations such as hospitals or nursing homes.

Aim 4 Summary

Although there were several factors found to differentiate high- and low-quality *High AA HHAs*, for each of the outcome variables far fewer than half of the predictor variables were found to predict quality. Thus, although this aim provided useful information, further research is needed to examine variation in *High AA HHAs* and begin to uncover reasons why some *High AA HHAs* are able to provide high-quality care when others cannot.

Policy Implications

Home health care is one of the fastest growing segments of health care, with an increase in spending of 4.8% in 2014, up from an increase of 3.8% in 2013. (CMS, 2015a). This is likely due to several factors: the aging of the U.S. population, which is expected to double by the year 2050 (Ortman, Velkoff, and Hogan, 2014; U.S. Census Bureau, 2013); Medicare policies that are focused on reducing hospital readmissions for specific health conditions; and Affordable Care Act policies that have led to increased spending by states (via Medicaid) on home health care for chronically ill adults who, in the past, were residents of nursing homes.

Racial differences were not found for four of the six outcome of care measures used in this study. Although reasons for this are unclear, there are several possibilities that have policy implications. In this study we found that *High AA HHAs,* on average, served a more diverse population than *Low AA HHAs* (i.e., *High AA HHAs* had a higher percentage of White and Hispanic patients while *Low AA HHAs* served mainly White patients) and were located in communities that, though racially segregated (measured as the percentage of county population that was African American), were less segregated than the communities where *Low AA HHAs* were located (patient population often mirrors that of the community in which the healthcare

organization is located). There might be a segment of *High AA HHAs* that are not diverse in terms of patient population served and are located in communities that are significantly racially segregated. It is possible then that *High AA HHAs* with a more diverse population have higher quality of care compared to *High AA HHAs* with a less diverse population (i.e., *High AA HHAs* with an extremely high percentage of African American patients). Because businesses tend to hire from their own communities, *High AA HHAs* located in less segregated communities might have a more diverse staff, both in terms of leadership (e.g., CEO, CFO, director) and regular staff (e.g., RNs, speech therapists, nurse aides). This might lead to less institutional bias and a greater ability or willingness to recognize when institutional policies and practices could lead to disparate outcomes for minority patients.

There have been studies that have suggested that patient-provider racial congruence is necessary or useful for improved patient-provider communication and outcomes of care. However, given that *High AA HHAs* have been found, on average, to have a more diverse patient population, and if their staffing is also equally diverse, it might be that patient and staff diversity reduces racial differences in quality of care. Although further studies are needed to investigate the racial makeup of the staff of home healthcare agencies, specifically examining *High* and *Low AA HHAs* (because *Low AA HHAs* are less diverse in terms of patients served), findings such as these could bolster policies and initiatives aimed at diversifying the healthcare workforce. Nurses and other healthcare providers need first to understand that racism still exists in health care. Also, having healthcare providers out in the community building trust with patients and their families could help encourage minorities to take an interest in healthcare professions. Providing adequate funding for schools located in minority communities, with a specific focus on science, could also boost interest in healthcare professions. High schools that serve a large minority

population could partner with local universities or hospitals to introduce students to the variety of options that exist in the field of health care.

In addition, policies could be developed to encourage hospitals, nursing homes, and outpatient clinics to diversify their patient populations in an effort to eliminate racially segregated healthcare organizations. One possible policy solution would be to eliminate the disparity in payment between Medicare and Medicaid. There would be fewer hospitals and outpatient clinics that serve a high percentage of Medicaid patients and this could possibly lead to more diverse hospitals and outpatient clinics. In addition, allowing Medicare to pay for a larger percentage of nursing home care would help to eliminate having nursing homes that are heavily dependent on Medicaid and often racially segregated. Ultimately however, changing the diversity of healthcare organizations will require significant community changes—both socially and politically—because patients tend to seek care in their own communities (Konetzka & Werner, 2009). Acknowledging that racism still exists in our communities, that "White privilege" is real, and that there are institutional policies and practices that perpetuate differences is a necessary first step in eradicating racially segregated communities and ensuring racially diverse, high-quality health care for *all* individuals.

Where racial differences were found, the findings of this study indicate that site of care (i.e., the community in which a home healthcare agency is located) and organizational resources both play important roles in influencing racial differences in the quality of home health care. Similar characteristics differentiated high-quality *High AA HHAs* from low-quality *High AA HHAs*. These findings are in line with recent disparities studies and a 2015 Kaiser Family Foundation brief focused on social determinants of health, which identified social determinants of health such as neighborhood and physical environment, community context, and healthcare

system as important factors influencing racial disparities (KFF, 2015). Thus, policy interventions discussed next and aimed specifically at the *High AA HHAs* providing the lowest quality of care might help low quality *High AA HHAs* provide higher quality of care and further reduce racial differences between *High* and *Low AA HHAs*.

The study findings also provide a starting point for researchers interested in examining factors that influence differences in quality of home health care. One way to help further disparities research on home healthcare quality of care would be to consider publicly reporting race-specific rates of Home Health Compare process of care and outcome of care measures (Lopez & Jha, 2013). This would enable researchers to more easily access quality of care information and specifically examine whether racial differences exist *between* home healthcare agencies (i.e., *High AA HHAs* overall provide worse quality of care compared to *Low AA HHAs*) or *within* home healthcare agencies (i.e., within individual home healthcare agencies African American patients receive worse quality of care compared to White patients receiving care from the same home healthcare agency).

Home healthcare agencies need to be encouraged to accurately collect patient race/ethnicity information; it is included in the initial OASIS assessment, but home healthcare agencies need to make sure therapists or nurses collecting this information do so by asking a patient his race and ethnicity rather than making assumptions based on visible characteristics. Home healthcare agencies then need to be encouraged (as a first step) to use this information to stratify their patient outcome data. This type of policy would serve a dual purpose: It will allow home healthcare agencies to accurately identify the presence or absence of racial differences, and then the agencies can develop targeted interventions to address any noted racial differences in

quality of home health care (Health Research and Educational Trust, 2014). This is knowledge that disparities researchers can use to examine between-agency racial disparities.

For this study, the findings indicated the racial differences were between *High* and *Low AA HHAs* and therefore suggest a need for policy interventions aimed at lower-performing home healthcare agencies, not interventions directed specifically at providers or initiatives aimed at all home healthcare agencies. Although individual-level interventions, or interventions that are not specifically targeted to *High AA HHAs* (i.e., generic interventions), might improve quality of care for *all* home healthcare patients, findings of this study suggest that they will not reduce or eliminate racial differences in quality of care. However, it is possible that some generic quality improvement interventions, while benefitting *all* home healthcare patients, might provide an even greater benefit to African American (and other minority) users of home healthcare and therefore reduce differences in quality of care. An example of such an intervention might be legislation requiring a certain level of education for staff of home healthcare agencies. If *High AA HHAs* have NAs, RNs, and other staff that have a lower level of education (not investigated in this study) compared to *Low AA HHAs* then such an intervention, while benefitting all users of home healthcare, could actually provide a greater benefit to African American users of home healthcare.

High AA HHAs are resource-poor and this lack of resources, both in terms of community support and organizational resources, has been linked to poor quality of care. Thus, policy solutions should include finding ways to increase resources for these agencies (Mor et al., 2004). One way to increase resources for *High AA HHAs* would be for states to establish pay-for-performance schemes for all HHAs. Pay-for-performance schemes typically reward healthcare providers for meeting a certain threshold for quality improvement. However, there is the

possibility that racial disparities will increase as a result of pay for performance (though this has not been borne out thus far with hospitals) and specific policies will need to be put into place to guard against the possibility (Damberg, Elliott, & Ewing, 2015; Werner & Asch, 2005). In addition, resource-poor providers who are providing low quality of care are often unable to meet this threshold, even though they may be improving quality of care (Konetzka & Werner, 2009). Thus, *High AA HHAs* that are providing low quality of care could be given an initial bonus to meet quality improvement thresholds. These providers could then continue to receive additional bonuses if they are improving quality of care, even if they are not meeting the thresholds established by the state and/or federal government (Mor et al., 2004; Konetzka & Werner, 2009).

The study also presented an opportunity to identify and begin to understand the community characteristics that might contribute to differences in care between *High* and *Low AA HHAs*. Absent necessary resources, *High AA HHAs* in poor communities may struggle to provide high-quality care to their patients. Although location itself (e.g., rural) is immutable, the other community characteristics identified previously are problems that are entrenched in our society and are likely not amenable to simple policy solutions. Rather, they will require the cooperation and input of community members, researchers from multiple disciplines, and government at all levels. Initiatives such as improving early childhood education (including increasing access to high-quality education), which could lead to a reduction in the achievement gap that exists between racial minorities and Whites, and improving public transportation, which could provide better access to employment opportunities and health care, could both lead to increases in employment rates in communities with a high minority (and low White) population (KFF, 2015). Higher rates of employment in these communities could in turn lead to an increase in per capita income and, indirectly, more adequate resources for home healthcare agencies located in these

communities. These are long-term solutions that will be difficult to implement and the pathways that link community problems with racial disparities in quality of care are not well understood. Thus, a significant amount of research is still needed in this area.

Organizational characteristics were also found contribute to racial differences in care between *High* and *Low AA HHAs* and many of these are factors that can be targeted for change. For example, *High AA HHAs* that are for-profit might be encouraged to invest some of their revenues into improved quality of care rather than give it to their investors. To encourage this, improved performance on quality of care measures should be tied to payment increases for home healthcare agencies (i.e., pay for performance), similar to what is done for hospitals. In addition, one possible policy solution for young *High AA HHAs* that are struggling financially would be for the state and federal government to provide incentives for these home healthcare agencies to partner with larger, more profitable home healthcare agencies to learn more effective ways to allocate limited resources.

As another example, 77% of all home healthcare expenditures are paid for by Medicare and Medicaid and the overwhelming majority of home healthcare users have Medicare as their primary payer of home healthcare services. In addition, patients of *High AA HHAs* have significantly longer length of stay compared to *Low AA HHAs*. Currently, Medicare pays for home healthcare based on 60-day "episodes of care," which are defined as the time from admission to discharge (discharge either from services or to another healthcare service such as nursing home or hospital care). Thus, a home healthcare agency is paid a specific amount per patient for 60 days of care. This specific amount is based on the patient's condition and identified care needs (CMS, 2015b). If a patient receives care for less than 60 days, each visit is paid based on a service-specific visit amount. Patients who need care for an extended period of

time (i.e., patients who need care for more than one 60 day episode of care) are considered outliers by the CMS and their care is paid for at a higher rate to account for associated increased expenses (CMS, 2015b). However, it is unclear whether this amount is enough to cover the increased expenses associated with care provided to outlier patients. Policy makers need to examine whether this reimbursement rate for outlier patients adequately covers increased expenses and, if not, this discrepancy needs to be addressed because it likely places an undue burden on *High AA HHAs*.

One way to address this payment disparity would be to examine the relationship between home healthcare patient zip codes and health status. Patient zip code (i.e., the community in which a patient lives) has been found to be a significant predictor of health outcomes in several settings, including a recent study of home healthcare agencies (Slade-Sawyer, 2014; Towne et al., 2015). It might be that basing home healthcare reimbursement rates on zip codes rather than health status on admission to home care, specifically those for outliers would improve payment resources for *High AA HHAs*.

In summary, site of care (the community in which a home healthcare agency is located) and organizational characteristics (i.e., length of stay, profit status) have been shown to influence racial differences between *High* and *Low AA HHAs*. Diverse policies aimed at improving communities, an understanding that all policies can have an effect on health and health care (and in turn, racial differences), and organizational initiatives aimed at low-performing *High AA HHAs* are needed to reduce and ultimately eliminate racial differences in the quality of home health care.

Limitations

Theory of Institutional Racism

The first limitation to this study was the inherent limitations of theory of institutional racism and the conceptual model used to guide this study. Although the theory of institutional racism was useful in identifying possible types and sources of institutional racism that contribute to racial differences in the quality of home health care, one of the challenges to using the theory of institutional racism is that it is a macro-level theory, but institutional racism is created and perpetuated, either intentionally or unintentionally, at both the macro- (institutional) and micro- (individual) level. At the micro-level, the beliefs and actions of individuals (often White decision-makers), either consciously or sub-consciously, are influenced by social institutions (Feagin & Bennefield, 2014). It is individuals (again, often White decision-makers) who are responsible for the development and implementation of institutional policies, practices, and procedures; but the effect of institutional policies, practices, and procedures is at the institutional or macro level (Feagin & Bennefield, 2014). In addition, the conceptual model used for this study was a macro-level model that was designed to identify which various types and sources of institutional racism influenced differences in quality of home health care. It was not a model designed to identify the mechanisms of institutional racism. In order to truly understand how institutional racism becomes embedded in organizations (and subsequently social institutions) it is essential to develop a cross-level theory integrating macro- and micro-level factors.

For example, data on micro-level factors such as individual biases and implicit assumptions (both patient and healthcare provider), health literacy, education of healthcare providers, and distrust (both patient and provider) are vital to developing a cross-level theory. These and many other micro-level factors influence the patient-provider encounter; such factors also have an effect on healthcare organizations, the institution of health care, and other social

institutions (Feagin & Bennefield, 2014). In addition, the patient-provider encounter itself is also influenced by the larger environment (including the healthcare organization and institutional environment) in which it takes place, an environment that is affected by both micro- and macro-level factors. This creates a complicated web of mechanisms of institutional racism that is difficult to untangle. One way to begin to disentangle these pathways is to develop the theory of institutional racism into a truly cross-level theory that combines knowledge of both macro- and micro-level mechanisms. A necessary first step will be collecting high quality primary data on both micro- and macro-level factors, for the purposes of examining mechanisms of institutional racism.

Endogeneity

The second limitation was the potential for endogeneity in the model. An endogenous variable is an independent variable in a model that is correlated with the error term of the equation predicting the dependent variable (Dowd & Town, 2002; Wooldridge, 2010). There are several different types of endogeneity and two that are particularly relevant to the study are discussed below (Wooldridge, 2010).

Reverse causality. Reverse causality (Dowd & Town, 2002) occurs when A is assumed to cause B, but in fact B causes A. If reverse causality is present, a biased estimate of the beta coefficient will be produced, leading to an incorrect understanding of the relationship between the independent and dependent variables (Dowd & Town, 2002; Shadish et al., 2002). For example, in this study, agency age (number of years Medicare-certified) was associated with differences in care; that is, home healthcare agencies that had been Medicare-certified for fewer years had poorer quality of care, as indicated by the results of this study. However, it is possible that the direction of the relationship is actually reversed—agencies with poorer quality of care do not stay open for very long and are therefore "younger" (i.e., Medicare-certified for fewer years).

This might be because providers do not make referrals to agencies that provide poorer quality of care and patients do not want to use the agencies given their quality scores (though evidence for patient use of quality scores is limited). Thus, home healthcare agencies that provide poorer quality of care might be more likely to go out of business more quickly than home healthcare agencies that provide higher quality of care. One way to address this problem is to be certain that the independent variable occurs before the dependent variable (Shepherd, 2008). For this study, using data on the independent variables for the years 2010 and for the dependent variables from 2011 helped reduce, although not entirely eliminate, the potential for endogeneity.

Omitted variable bias. An omitted variable is one that is unobservable and is a cause of both the independent and dependent variable. Therefore, the omitted or unobserved variable is contained in the error term included in the model (Dowd & Town, 2002). When omitted variables are present, the causal relationship between the independent and dependent variables will be biased; that is, the true causal relationship will be masked by the omitted variable (Dowd & Town, 2002). For example, nurse staffing levels in nursing homes are thought to be positively correlated with quality of care (Castle & Engberg, 2007, Harrington & Swan, 2003). Thus, home healthcare agencies with low levels of staffing are hypothesized to have low quality of care. Although this is a possibility, a variable such as job satisfaction could also be correlated with both nurse staffing levels and quality of care. Without job satisfaction in the model, it might be concluded that quality of care is lower in agencies with lower levels of nurse staffing. However, the quality of care for all patients might be lower, in part, because of job satisfaction. Differences in quality of care between HHAs might then be partially due to nurse staffing levels and job satisfaction.

To reduce the potential for omitted variable bias, variable identification and selection in the study was guided by the theory of institutional racism, the conceptual model that was developed based on this theory, and the nursing home disparities literature. However, this strategy does not fully eliminate the concern of omitted variable bias because there is always the possibility that some unobserved variables will remain unknown and therefore not be included in the model. There are also limitations as to the variables that are available in secondary data sets and thus even though a variable could be identified as important to include in the model, the data might not be obtainable (Dowd & Town, 2002).

Measurement Error

Measurement error is a threat to statistical conclusion validity, which is the appropriate use of statistics to make inferences as to whether the independent variables and outcomes measures covary (Shadish et al., 2002). In observational studies, especially when self-reported data are included, measurement error can lead to inaccurate conclusions about relationships among variables (Shadish et al., 2002). The demographic data from OASIS is supposed to be reported by the patient, but it is possible that the RN (or other provider) did not ask the patient his/her race and made an inaccurate assumption about the patient's race (Regenstein & Sickler, 2006). Patients are also sometimes unclear about the specific race categories used and may identify themselves in a way that is different from the categories that are used. In addition, some of the HHC data are also self-reported because some of these measures are derived from some of the self-reported OASIS data.

One way to address the threat of measurement error is to assess the reliability for each measure (Shadish et al., 2002). The reliability of the OASIS measures has been estimated in several different studies that have used methods such as inter-rater reliability, intra-rater reliability, and internal consistency (Hittle et al., 2003; Kinatukara et al., 2005; Madigan &

Fortinsky, 2001; Madigan & Fortinsky, 2004; Shaughnessy et al., 2002). The OASIS measures were found to be reliable in all but two of these studies (Madigan & Fortinsky, 2001; Kinatukara et al., 2005). However, the reliability of the OASIS outcome measures, from which the HHC data are derived, has only been estimated in one study, though the measures were found to be reliable (Hittle et al., 2003).

The Home Health Compare Data

The majority of outcome measures available on HHC are measures of improvement in functional ability and patients who cannot improve are not included in denominators of these measures (Sangl et al., 2005; MedPAC, 2006). This is an example of a ceiling effect, which exists when the respondents cluster near the highest score but the full range of the variable is restricted (Shadish et al., 2002). This reduction in range for most of the outcome measures is also a threat to statistical conclusion validity and can lead to an inaccurate conclusion about the relationship between the independent variables and outcome measures that have a restricted range (Shadish et al., 2002). In addition, the HHC outcome measures do not include measures of process of care or structure of care, two important components of quality (Donabedian, 1988; Mor, 2005). By including such measures, more patients could be included and the HHC data set would be more representative of home healthcare patients (Sangl et al., 2005). Because the HHC data have already been collected, there is no way to alter the range of the outcome measures or the type of measures included in the data set.

Although we recognize the limitations, this study was unique in that it created a unique data set combining the OASIS, ARF, HCRIS-HHA, POS, and HHC data. By using this data set, the study extended disparities research into the home healthcare setting and expanded on the long-term care disparities research by including several sets of factors that have been explored individually but not together in one study. In addition, independent variables were included on

the basis of theory, something not often done in disparities in quality of care studies. Taken together, these innovative methods will strengthen our understanding of the factors that contribute to differences in the quality of home health care.

Suggestions for Future Research

To our knowledge, this study was the first to explore racial differences in quality of home health care between *High* and *Low AA HHAs,* the first to examine potential factors that contribute to racial differences in quality of home health care, and the first to have investigated the variation in quality among *High AA HHAs*. However, the results of the study were mixed and further research is needed to examine the differences in quality between *High* and *Low AA HHAs,* to identify the factors that influence racial differences in quality of home health care, and to explore variation in quality between high- and low-quality *High AA HHAs*.

A significant problem for expanding research in this area is the lack of high-quality home healthcare data. Researchers are fortunate to have the Home Health Compare dataset, which includes process of care and outcome of care measures that are already risk-adjusted and are reported for the vast majority of home healthcare agencies in the United States. However, these measures are not stratified by race or ethnicity and therefore to identify racial disparities, researchers must purchase OASIS data and create a linked dataset. Thus, there are few studies that have examined racial disparities in the quality of home health care and none that have looked at potential causes of disparities.

Another challenge for disparities researchers interested in examining racial disparities between healthcare organizations is the lack of standardization in terms of how healthcare organizations are stratified by race. Nearly every study that compared healthcare organizations that served a high percentage of African American (or minority) patients to those that served a

low percentage of African American (or minority) patients stratified organizations differently. Some defined "high" as those in the top 5%; some defined "high" as those with no African American (or minority) discharges; some included the top three quartiles as "high" (Chisholm et al., 2013; Jha et al., 2007; Jha et al., 2008; Rose et al., 2012). Therefore, an important next step for disparities researchers in general is to examine stratification strategies to determine if there could be a standard stratification scheme. It might be that different schemes are needed for different types of healthcare organizations (i.e., outpatient clinics need to be stratified differently than nursing homes), but this would help make the overall body of disparities research more consistent.

As noted in chapter 1, there is also no standardized definition of when a racial "difference" in quality of care or outcome of care becomes a "disparity" (Hebert et al., 2008). The Institute of Medicine, the AHRQ, and the World Health Organization all have different definitions of disparities. Thus, researchers can choose how to define a disparity and this makes a difference in terms of the outcomes of a study (Hebert et al., 2008). However, it is possible that some African Americans and other minorities might view the term "disparity" as a sanitized term, one that avoids acknowledging that, compared to White patients, the majority of African American (and other minority) patients receive care from different, often inferior, healthcare organizations and that this type of care leads to poorer health and outcomes for African American (and other minority) patients (G.R. Alexander, personal communication, March 28, 2016). Rather, African American and other minority patients might instead prefer the term "differences" because it clearly and simply acknowledges the truth about our healthcare system: that African American and other minority patients receive care in different settings from White patients, and this care is often inferior to care received by White patients (G.R. Alexander,

personal communication, March 28, 2016). Nevertheless, many researchers who are focused on racial disparities (in access, health, or quality) prefer to use the term "disparity" because it tends to carry more weight both in terms of significance to the larger research community and policy implications. Therefore, while a standardized definition of "disparity" is needed, it is also possible that, depending on the audience, findings related to racial differences in quality of care (or racial differences access or health) need to be communicated using different terms.

Another important step is to further examine how the theory of institutional racism can help researchers explain racial differences in quality of care. Institutional racism is typically covert and due to policies and practices that are the result of individual stereotypes, prejudices, and biases (University of Dayton, 2008). The individuals who hold these stereotypical beliefs or biases do not see that their beliefs are racist and do not necessarily set out to make policies that are racist (University of Dayton, 2008). For example, county unemployment rate, a community characteristic in the conceptual model used in this study, reflects two social institutions—business and labor. African Americans are more likely than whites to live in communities with a high minority (and low White) population and that have a disproportionate number of individuals who are not well prepared for employment due to poor-quality schools that are characteristic of such neighborhoods. Therefore, businesses frequently search elsewhere to meet their employment needs (Williams & Collins, 2001). Such decisions are not necessarily intentionally racist or intended to cause harm, but they contribute to a situation in which African Americans live in communities that are disproportionately characterized by high rates of unemployment (Williams & Collins, 2001). In turn, communities with high rates of unemployment lack an adequate tax base, and community resources and healthcare organizations located in such communities likely have fewer resources as a result (Olson, 2010). *High AA HHAs* are more

likely to be located in communities with high rates of unemployment, and therefore these home healthcare agencies may have fewer resources to put toward improving quality of care (Mor et al., 2004; Miller et al., 2006). Thus, because African American patients tend to seek care in their own communities, they are particularly vulnerable to poor quality of care in these communities (Konetzka & Werner, 2009).

This study has shown that community and organizational characteristics were associated with racial differences in the quality of home health care for two of the six outcome of care measures used in this study. Community and organizational characteristics (though only a few of them) were also the only factors that differentiated high- and low-quality *High AA HHAs.* The variables included in this study were chosen to reflect different policies and practices of social institutions that might influence quality of home health care. However, the data used were all from secondary data sources, not collected for the purpose of examining institutional racism. Thus, to effectively examine the role of institutional racism in perpetuating racial differences in the quality of home health care, primary data—data that are specifically collected to explore institutional racism at both the macro- and micro-level and used to create a cross-level (at the macro- and micro-level) theory and conceptual model designed to identify mechanisms of institutional racism—are needed. For example, researchers might consider qualitative methodologies such as document reviews, interviews with a variety of institutional leaders and regular staff, interviews with patients and caregivers, or ethnography. This type of research could help identify institutional policies and practices that influence racial differences and examine the pathways by which social institutions contribute to racial differences in quality of home health care. This is the research that is needed to develop policies and interventions that will truly reduce and ultimately eliminate racial differences in quality of home health care.

Conclusion

This study may be the first of its kind in the area of home health care. The overall purpose of this study was to first identify whether or not racial differences in quality of care existed between *High* and *Low AA HHAs* and, if so, to subsequently identify characteristics that might help to explain racial differences in quality of home health care. In addition, variation in quality among *High AA HHAs* was explored.

Results of this study showed that whereas *High AA HHAs* had a more mixed patient population, *Low AA HHAs* were overwhelmingly White. In addition, *High AA HHAs* were significantly different from *Low AA HHAs* in terms of many market, community, and organizational characteristics. These characteristics indicated that *High AA HHAs* were located in resource-poor counties and that they were organizationally different (i.e., for-profit compared to not-for-profit; smaller; "younger") compared to *Low AA HHAs*. Consistent with other disparities research, findings from this study indicated that racial differences did exist between *High* and *Low AA HHAs* for two of the six outcome of care measures and that community and organizational characteristics (i.e., where a home healthcare agency is located and the organizational resources it has) were the factors that had the greatest influence on racial differences in quality of home health care. These factors also were also the only ones to differentiate high-quality *High AA HHAs* from low-quality *High AA HHAs*.

This study was guided by the theory of institutional racism, which posits that policies and practices of social institutions, either intentionally or unintentionally, can result in harm for racial minorities. This study provided initial evidence that social institutions do play a role in contributing to racial differences in the quality of home health care. However, this study did not provide evidence as to how social institutions might influence racial differences in quality of

home health care. One of the challenges with the theory of institutional racism is that this type of racism is difficult to identify because it is so often covert and individuals who create racist policies and practices (either intentionally or unintentionally racist) are not aware of their actions or the results of their actions. Additional studies that examine the interconnected role of individuals and institutions in creating and perpetuating institutional racism are needed to further our understanding of how policies and practices of social institutions can perpetuate racial differences in health care.

APPENDIX A. MULTIPLE REGRESSION RESULTS: OUTCOME VARIABLE O1—HOW OFTEN HOME HEALTHCARE PATIENTS GOT BETTER AT WALKING OR MOVING AROUND

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
Model 1: AA serving status	Low AA status	reference group			0.0001
	High AA status	-0.17	(0.42)	[-1.001, 0.65]	
Model 2: AA serving status + market characteristics	Low AA status	reference group			0.0001 (0)
	High AA status	-0.17	(0.42)	[-1.001, 0.66]	
	HHI	0.13	(1.43)	[-2.66, 2.92]	
Model 3: AA serving status + market characteristics + community characteristics	Low AA status	reference group			0.0102 (0.0101)
	High AA status	-0.29	(0.44)	[-1.15, 0.57]	
	HHI	1.07	(1.54)	[-1.95, 4.08]	
	Percent African American population	0.03	(0.02)	[-0.02, 0.07]	
	Per capita income	-0.00003	(0.00002)	[-0.00007, 0.000009]	
	Number of unemployed persons—1st quartile (lowest)	1.79	(0.76)*	[0.301, 3.29]	
	Number of unemployed persons—2nd quartile (medium-low)	0.28	(0.58)	[-0.85, 1.42]	
	Number of unemployed persons—3rd quartile (medium-high)	0.88	(0.54)	[-0.17, 1.93]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.08	(0.04)*	[-0.16, -0.004]	
	Location—"not a statistical area"	-0.27	(0.56)	[-1.37, 0.84]	
	Location—"Metropolitan statistical area"	-1.15	(0.44)*	[-2.02, -0.28]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	2.23	(1.62)	[-0.95, 5.41]	
	Midwest census region	0.79	(0.51)	[-0.22, 1.79]	
	South census region	-0.59	(0.61)	[-1.79, 0.6004]	
	West census region	reference group			
Model 4: AA serving status + market characteristics + community characteristics +	Low AA status	reference group			0.029 (0.0188)
	High AA status	-0.26	(0.45)	[-1.14, 0.61]	
	HHI	1.51	(1.53)	[-1.49, 4.52]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
organizational characteristics	Percent African American population	0.02	(0.02)	[-0.02, 0.07]	
	Per capita income	-0.00003	(0.00002)	[-0.00007, 0.000006]	
	Number of unemployed persons—1st quartile (lowest)	1.87	(0.76)*	[0.38, 3.36]	
	Number of unemployed persons—2nd quartile (medium-low)	0.43	(0.57)	[-0.69, 1.56]	
	Number of unemployed persons—3rd quartile (medium-high)	0.92	(0.53)	[-0.13, 1.97]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.09	(0.04)*	[-0.17, -0.02]	
	Location—"not a statistical area"	-0.6	(0.56)	[-1.72, 0.49]	
	Location—"Metropolitan statistical area"	-1.23	(0.45)*	[-2.1, -0.35]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	2.14	(1.61)	[-1.02, 5.3]	
	Midwest census region	0.77	(0.51)	[-0.22, 1.77]	
	South census region	-0.72	(0.61)	[-1.9, 0.47]	
	West census region	reference group			
	For-profit ownership status	4.77	(0.97)*	[2.87, 6.67]	
	Not-for-profit ownership status	4.14	(0.99)*	[2.21, 6.07]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0005	(0.0001)*	[0.0002, 0.0007]	
	Number of years HHA Medicare certified	0.04	(0.02)*	[0.01, 0.07]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	15.45	(14.37)	[-12.71, 43.62]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	2.26	(14.75)	[-26.66, 31.18]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	13.1	(14.89)	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare	11.25	(14.4)	[16.99, 39.48]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
	(HMO or FFS) and Medicaid (HMO or FFS) health insurance				
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	3.19	(29.2)	[-54.05, 60.43]	
	Operating profit margin	-0.06	(0.05)	[-0.16, 0.04]	
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	Low AA status	reference group			0.029 (0)
	High AA status	-0.25	(0.45)	[-1.12, 0.63]	
	HHI	1.53	(1.54)	[-1.47, 4.54]	
	Percent African American population	0.02	(0.02)	[-0.02, 0.069]	
	Per capita income	-0.00003	(0.00002)	[-0.00007, 0.000006]	
	Number of unemployed persons—1st quartile (lowest)	1.86	(0.76)*	[0.36, 3.35]	
	Number of unemployed persons—2nd quartile (medium-low)	0.41	(0.58)	[-0.72, 1.54]	
	Number of unemployed persons—3rd quartile (medium-high)	0.93	(0.53)	[-0.12, 1.97]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.09	(0.04)*	[-0.17, -0.01]	
	Location—"not a statistical area"	-0.6	(0.56)	[-1.79, 0.501]	
	Location—"Metropolitan statistical area"	-1.21	(0.45)*	[-2.08, -0.33]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	2.003	(1.61)	[-1.15, 5.16]	
	Midwest census region	0.75	(0.51)	[-0.25, 1.75]	
	South census region	-0.75	(0.61)	[-1.94, 0.44]	
	West census region	reference group			
	For-profit ownership status	4.82	(0.97)*	[2.92, 6.71]	
	Not-for-profit ownership status	4.1	(0.98)*	[2.17, 6.03]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0004	(0.0002)*	[0.0001, 0.0008]	
	Number of years HHA Medicare-certified	0.04	(0.02)*	[0.01, 0.07]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	15.45	(14.37)	[-12.71, 43.62]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	2.26	(14.75)	[-26.66, 31.18]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	13.1	(14.89)	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	11.25	(14.4)	[-16.99, 39.48]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	3.19	(29.2)	[-54.05, 60.43]	
	Operating profit margin	-0.06	(0.05)	[-0.16, 0.04]	
	Number FTE Aides	-0.002	(0.002)	[-0.007, 0.002]	
	Number FTE LPNs	-0.005	(0.006)	[-0.02, 0.008]	
	Number FTE RNs	0.002	(0.006)	[-0.01, 0.01]	

Note: AA (African American); SE (Standard Error); CI (Confidence Interval); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse.

APPENDIX B. MULTIPLE REGRESSION RESULTS: OUTCOME VARIABLE O3—HOW OFTEN HOME HEALTHCARE PATIENTS GOT BETTER AT BATHING

	Variables in this model	Parameter estimate (SE)	SE	95% CI	R^2 (change in R^2)
Model 1: AA serving status	Low AA status	reference group			0.0006
	High AA status	-0.85	(0.47)	[-1.77, 0.08]	
Model 2: AA serving status + market characteristics	Low AA status	reference group			0.0016 (0.001)
	High AA status	-0.95	(0.47)*	[-1.87, 0.02]	
	HHI	-4.01	(1.59)*	[-7.14, -0.89]	
Model 3: AA serving status + market characteristics + community characteristics	Low AA status	reference group			0.0234 (0.0218)
	High AA status	-1.001	(0.49)*	[-1.95, -0.04]	
	HHI	-1.52	(1.71)	[-4.87, 1.83]	
	Percent African American population	0.04	(0.03)	[-0.01, 0.09]	
	Per capita income	-0.0001	(0.00002)*	[-0.0001, -0.00003]	
	Number of unemployed persons—1st quartile (lowest)	1.37	(0.85)	[-0.29, 3.04]	
	Number of unemployed persons—2nd quartile (medium-low)	-1.13	(0.64)	[-2.39, 0.13]	
	Number of unemployed persons—3rd quartile (medium-high)	0.16	(0.59)	[-1.01, 1.33]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.19	(0.04)*	[-0.28, -.011]	
	Location—"not a statistical area"	-0.2	(0.63)	[-1.42, 1.02]	
	Location—"Metropolitan statistical area"	-2.09	(0.49)*	[-3.06, 1.12]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	3.61	(1.803)*	[0.07, 7.15]	
	Midwest census region	-0.39	(0.57)	[-1.51, 0.72]	
	South census region	-1.67	(0.68)*	[-2.99, -0.34]	
	West census region	reference group			
Model 4: AA serving status + market characteristics + community characteristics +	Low AA status	reference group			0.054 (0.0306)
	High AA status	-0.99	(0.49)*	[-1.96, -0.02]	
	HHI	0.04	(1.69)	[-3.29, 3.37]	

	Variables in this model	Parameter estimate (SE)	SE	95% CI	R^2 (change in R^2)
organizational characteristics	Percent African American population	0.04	(0.03)	[0.01, 0.1]	
	Per capita income	-0.0001	(0.00002)*	[-0.0001, -0.00004]	
	Number of unemployed persons—1st quartile (lowest)	1.78	(0.84)*	[0.14, 3.43]	
	Number of unemployed persons—2nd quartile (medium-low)	-0.75	(0.64)	[-1.99, 0.5]	
	Number of unemployed persons—3rd quartile (medium-high)	-0.02	(0.59)	[-1.14, 1.17]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.21	(0.04)*	[-0.3, -0.12]	
	Location—"not a statistical area"	-0.74	(0.62)	[-1.96, 0.48]	
	Location—"Metropolitan statistical area"	-2.1	(0.49)*	[-3.07, -1.13]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	3.92	(1.78)*	[0.43, 7.41]	
	Midwest census region	-0.2	(0.56)	[-1.3, 0.91]	
	South census region	-1.92	(0.67)*	[-3.24, -0.61]	
	West census region	reference group			
	For-profit ownership status	4.63	(1.07)*	[2.53, 6.72]	
	Not-for-profit ownership status	3.84	(1.09)*	[1.71, 5.98]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0006	(0.0002)*	[0.0003, 0.0009]	
	Number of years HHA Medicare certified	0.01	(0.02)	[-0.02, 0.05]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	35.82	(15.88)*	[4.69, 66.95]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	13.52	(16.3)	[-18.44, 45.48]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	35.75	(16.45)*	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare	34.5	(15.92)*	[3.3, 65.71]	

	Variables in this model	Parameter estimate (SE)	SE	95% CI	R^2 (change in R^2)
	(HMO or FFS) and Medicaid (HMO or FFS) health insurance				
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	-16.43	(32.27)	[-79.69, 46.82]	
	Operating profit margin	0.02	(0.06)	[-0.09, 0.13]	
Model 5: AA serving status + market characteristics + community characteristics + organizational characteristics + nurse staffing characteristics	Low AA status	reference group			0.05 (0)
	High AA status	-0.99	(0.49)*	[-1.97, -0.03]	
	HHI	0.06	(1.69)	[-3.26, 3.39]	
	Percent African American population	0.04	(0.03)	[-0.01, 0.09]	
	Per capita income	-0.0001	(0.00002)*	[-0.0001, -0.00004]	
	Number of unemployed persons—1st quartile (lowest)	1.75	(0.84)*	[0.11, 3.39]	
	Number of unemployed persons—2nd quartile (medium-low)	-0.78	(0.64)	[-2.02, 0.47]	
	Number of unemployed persons—3rd quartile (medium-high)	0.02	(0.59)	[-1.14, 1.18]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.21	(0.04)*	[-0.29, -0.12]	
	Location—"not a statistical area"	-0.72	(0.62)	[-1.94, 0.503]	
	Location—"Metropolitan statistical area"	-2.1	(0.49)*	[-3.07, -1.13]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	3.76	(1.78)*	[0.27, 7.25]	
	Midwest census region	-0.22	(0.56)	[-1.32, 0.88]	
	South census region	-1.96	(0.67)*	[-3.27, -0.65]	
	West census region	reference group			
	For-profit ownership status	4.65	(1.07)*	[2.56, 6.75]	
	Not-for-profit ownership status	3.83	(1.09)*	[1.69, 5.96]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.001	(0.0002)*	[0.0002, 0.0009]	
	Number of years HHA Medicare-certified	0.01	(0.02)*	[-0.02, 0.04]	
	Percentage of discharges with only Medicare	15.45	(14.37)	[-12.71, 43.62]	

	Variables in this model	Parameter estimate (SE)	SE	95% CI	R^2 (change in R^2)
	(HMO or FFS) health insurance				
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	2.26	(14.75)	[-26.66, 31.18]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	13.1	(14.89)	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	11.25	(14.4)	[-16.99, 39.48]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	3.19	(29.2)	[-54.05, 60.43]	
	Operating profit margin	0.02	(0.06)	[-0.09, 0.13]	
	Number FTE Aides	-0.004	(0.003)	[-0.01, 0.001]	
	Number FTE LPNs	-0.003	(0.01)	[-0.02, 0.01]	
	Number FTE RNs	-0.000001	(0.01)	[-0.02, 0.01]	

Note: AA (African American); SE (Standard Error); CI (Confidence Interval); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

APPENDIX C. MULTIPLE REGRESSION RESULTS: OUTCOME VARIABLE O4—HOW OFTEN HOME HEALTHCARE PATIENTS HAD LESS PAIN WHEN MOVING AROUND

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
Model 1: AA serving status	Low AA status	reference group			0.0016
	High AA status	-1.04	(0.55)	[-2.12, 0.04]	
Model 2: AA serving status + market characteristics	Low AA status	reference group			0.0157 (0.0141)
	High AA status	-1.48	(0.55)*	[-2.56, -0.404]	
	HHI	-17.67	(1.85)	[-21.29, -14.05]	
Model 3: AA serving status + market characteristics + community characteristics	Low AA status	reference group			0.0886 (0.0729)
	High AA status	0.02	(0.55)	[-1.06, 1.09]	
	HHI	-7.99	(1.93)*	[-11.77, -4.21]	
	Percent African American population	0.08	(0.03)*	[0.02, 0.14]	
	Per capita income	-0.0001	(0.00003)*	[-0.0001, -0.00003]	
	Number of unemployed persons—1st quartile (lowest)	1.92	(0.96)*	[0.04, 3.79]	
	Number of unemployed persons—2nd quartile (medium-low)	-0.43	(0.73)	[-1.85, 0.99]	
	Number of unemployed persons—3rd quartile (medium-high)	4.36	(0.67)*	[3.04, 5.68]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.37	(0.05)*	[-0.47, -0.27]	
	Location—"not a statistical area"	-1.15	(0.705)	[-2.53, 0.23]	
	Location—"Metropolitan statistical area"	-1.03	(0.56)	[-2.12, 0.06]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	0.86	(2.03)	[-3.12, 4.84]	
	Midwest census region	-3.25	(0.64)*	[-4.15, -1.99]	
	South census region	-6.21	(0.76)*	[-7.704, -4.71]	
	West census region	reference group			
Model 4: AA serving status + market characteristics + community characteristics + organizational characteristics	Low AA status	reference group			0.107 (0.0184)
	High AA status	0.13	(0.56)	[-0.97, 1.23]	
	HHI	-6.24	(1.92)*	[-10.01, -2.47]	
	Percent African American population	0.09	(0.03)*	[0.03, 0.15]	
	Per capita income	-0.00009	(0.00003)*	[-0.0001, -0.00004]	
	Number of unemployed persons—1st quartile (lowest)	2.31	(0.95)*	[0.45, 4.18]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
	Number of unemployed persons—2nd quartile (medium-low)	-0.1	(0.72)	[-1.48, 1.34]	
	Number of unemployed persons—3rd quartile (medium-high)	3.97	(0.67)*	[2.65, 5.3]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.37	(0.05)*	[-0.47, -0.28]	
	Location—"not a statistical area"	-1.47	(0.71)*	[-2.85, -0.09]	
	Location—"Metropolitan statistical area"	-0.94	(0.56)	[-2.04, 0.16]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	1.4	(2.02)	[-2.56, 5.36]	
	Midwest census region	-2.94	(0.64)*	[-4.2, -1.69]	
	South census region	-6.46	(0.76)*	[-7.95, -4.97]	
	West census region	reference group			
	For-profit ownership status	0.38	(1.21)	[-1.99, 2.76]	
	Not-for-profit ownership status	0.36	(1.23)	[-2.06, 2.78]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.0006	(0.0002)*	[0.0003, 0.0009]	
	Number of years HHA Medicare-certified	-0.03	(0.02)	[-0.07, 0.005]	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	24.02	(18)	[-11.25, 59.31]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	3.39	(18.48)	[-32.84, 39.61]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	21.11	(18.64)	[-15.44, 57.67]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	28.56	(18.04)	[-6.81, 63.93]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	-22.06	(36.57)	[-93.75, 49.64]	
	Operating profit margin	-0.1	(0.06)	[-0.23, 0.02]	
Model 5: AA serving status + market characteristics +	Low AA status	reference group			0.107 (0)
	High AA status	0.16	(0.56)	[-0.93, 1.26]	
	HHI	-6.2	(1.92)*	[-9.97, 2.43]	

	Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
community characteristics + organizational characteristics + nurse staffing characteristics	Percent African American population	0.09	**(**0.03)*	[0.03, 0.15]	
	Per capita income	-0.00008	(0.00003)*	[-0.0001, -0.00004]	
	Number of unemployed persons—1st quartile (lowest)	2.25	(0.95)*	[0.39, 4.12]	
	Number of unemployed persons—2nd quartile (medium-low)	-0.12	(0.72)	[-1.53, 1.29]	
	Number of unemployed persons—3rd quartile (medium-high)	3.97	(0.67)*	[2.66, 5.28]	
	Number of unemployed persons—4th quartile (highest)	reference group			
	Persons (%) below poverty level	-0.37	(0.05)*	[-0.47, -0.27]	
	Location—"not a statistical area"	-1.42	(0.71)*	[-2.804, -0.04]	
	Location—"Metropolitan statistical area"	-0.91	(0.56)	[-2.003, 0.19]	
	Location—"Micropolitan statistical area"	reference group			
	Northeast census region	1.18	**(**2.02)	[-2.77, 5.14]	
	Midwest census region	-2.98	(0.64)*	[-4.24, -1.74]	
	South census region	-6.51	(0.76)*	[-8.002, -5.03]	
	West census region	reference group			
	For-profit ownership status	0.404	(1.21)	[-1.97, 2.78]	
	Not-for-profit ownership status	0.29	(1.23)	[-2.13, 2.71]	
	Government-owned ownership status	reference group			
	Total yearly discharges per HHA	0.001	(0.0002)*	[0.0003, 0.001]	
	Number of years HHA Medicare-certified	-0.04	(0.02)	[-0.07, 0.003	
	Percentage of discharges with only Medicare (HMO or FFS) health insurance	15.45	(14.37)	[-12.71, 43.62]	
	Percentage of discharges with only Medicaid (HMO or FFS) health insurance	2.26	(14.75)	[-26.66, 31.18]	
	Percentage of discharges with Medicare (HMO or FFS) and one other type (not Medicaid) of health insurance	13.1	(14.89)	[-16.11, 42.26]	
	Percentage of discharges with Medicaid (HMO or FFS) and one other type (not Medicare) of health insurance	reference group			
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	11.25	(14.4)	[-16.99, 39.48]	
	Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) and one other type of health insurance	3.19	(29.2)	[-54.05, 60.43]	
	Operating profit margin	-0.103	(0.06)	[-0.23, 0.02]	

Variables in this model	Parameter estimate	SE	95% CI	R^2 (change in R^2)
Number FTE Aides	-0.001	(0.003)	[-0.01, 0.004]	
Number FTE LPNs	-0.004	(0.01)	[-0.02, 0.01]	
Number FTE RNs	-0.004	(0.01)	[-0.02, 0.01]	

Note: AA (African American); SE (Standard Error); CI (Confidence Interval); * = p <.05, <.01, <.001, <.0001; R^2 = the percentage of variance explained by all the variables included in each specific model; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

APPENDIX D: LOGISTIC REGRESSION RESULTS: OUTCOME VARIABLE O1—HOW OFTEN HOME HEALTHCARE PATIENTS GOT BETTER AT WALKING OR MOVING AROUND

Variables	Parameter Estimate	Wald χ^2 test	Odds ratio	95% CI
Market characteristics				
HHI	-0.43	0.27	0.65	[0.13, 3.34]
Community characteristics				
Percent African American	-0.005	0.21	0.99	[0.97, 1.02]
Per capita income	-0.00002	3.09	1.00	[1.00, 1.00]
Number of unemployed persons—1st quartile (lowest)	0.07	0.06	1.07	[0.61, 1.89]
Number of unemployed persons—2nd quartile (medium-low)	-0.18	0.49	0.83	[0.50, 1.39]
Number of unemployed persons—3rd quartile (medium-high)	-0.61	5.03*	0.54	[0.32, 0.93]
Number of unemployed persons—4th quartile (highest)	Reference group			
Persons (%) below poverty level	-0.04	4.58*	0.96	[0.92, 0.99]
Location—"not a statistical area"	-0.29	1.41	0.74	[0.46, 1.21]
Location— "Metropolitan statistical area"	-0.42	2.82	0.66	[0.40, 1.07]
Location— "Micropolitan statistical area"	Reference group			
Organizational characteristics				
For-profit ownership status	0.88	1.32	2.40	[0.54, 10.71]
Not-for-profit ownership status	0.42	0.27	1.53	[0.31, 7.51]
Government-owned ownership status	Reference group			
Total yearly discharges per HHA	0.00008	0.70	1.00	[1.00, 1.00]
Number of years HHA Medicare- Certified	-0.006	0.55	0.99	[0.98, 1.01]
Percentage of discharges with only Medicare (HMO or FFS) health insurance	1.91	8.14*	6.78	[1.82, 25.22]
Percentage of discharges with only Medicaid (HMO or FFS) health insurance	Reference group			
Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	1.51	2.15	4.51	[0.60, 33.84]
Operating profit margin	-0.04	1.04	0.96	[0.89, 1.04]
Nurse staffing characteristics				
Number FTE Aides	0.002	0.66	1.00	[0.99, 1.01]
Number FTE LPNs	-0.04	3.88*	0.96	[0.93, 1.00]
Number FTE RNs	-0.0003	0.03	1.00	[0.99, 1.00]

Note: * = p <.05, <.01, <.001, <.0001; Odds ratio is probability of High AA HHA being high quality; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

APPENDIX E: LOGISTIC REGRESSION RESULTS: OUTCOME VARIABLE O2—HOW OFTEN HOME HEALTHCARE PATIENTS GOT BETTER AT GETTING IN AND OUT OF BED

Variables	Parameter Estimate	Wald χ^2 test	Odds ratio	95% CI
Market characteristics				
HHI	-1.06	1.46	0.35	[0.06, 1.93]
Community characteristics				
Percent African American	0.003	0.06	1.00	[0.98, 1.02]
Per capita income	-0.00002	4.62*	1.00	[1.00, 1.00]
Number of unemployed persons—1st quartile (lowest)	0.14	0.22	1.15	[0.65, 2.01]
Number of unemployed persons—2nd quartile (medium-low)	-0.04	0.02	0.97	[0.58, 1.62]
Number of unemployed persons—3rd quartile (medium-high)	0.11	0.18	1.12	[0.67, 1.87]
Number of unemployed persons—4th quartile (highest)	Reference group			
Persons (%) below poverty level	-0.03	2.4	0.97	[0.93, 1.01]
Location – "not a statistical area"	0.02	0.005	1.02	[0.63, 1.65]
Location—"Metropolitan statistical area"	-0.13	0.27	0.88	[0.54, 1.43]
Location—"Micropolitan statistical area"	Reference group			
Organizational characteristics				
For-profit ownership status	-0.82	2.91	0.44	[0.17, 1.13]
Not-for-profit ownership status	-0.22	0.18	0.80	[0.29, 2.23]
Government-owned ownership status	Reference group			
Total yearly discharges per HHA	-0.00001	0.03	1.00	[1.00, 1.00]
Number of years HHA Medicare-certified	0.005	0.47	1.01	[0.99, 1.02]
Percentage of discharges with only Medicare (HMO or FFS) health insurance	1.57	6.19*	4.81	[1.39, 16.59]
Percentage of discharges with only Medicaid (HMO or FFS) health insurance	Reference group			
Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	1.27	1.63	3.56	[0.51, 25.02]
Operating profit margin	0.03	1.22	1.03	[0.98, 1.08]
Nurse staffing characteristics				
Number FTE Aides	0.003	0.99	1.00	[0.99, 1.01]
Number FTE LPNs	-0.07	9.32*	0.94	[0.89, 0.97]
Number FTE RNs	-0.0003	0.0334	1.00	[0.99, 1.00]

Note: * = p <.05, <.01, <.001, <.0001; Odds ratio is probability of High AA HHA being high quality; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

APPENDIX F: LOGISTIC REGRESSION RESULTS: OUTCOME VARIABLE O8—HOW OFTEN HOME HEALTHCARE PATIENTS GOT BETTER AT TAKING THEIR MEDICATIONS CORRECTLY BY MOUTH

Variables	Parameter Estimate	Wald χ^2 test	Odds ratio	95% CI
Market characteristics				
HHI	-1.51	2.14	0.22	[0.03, 1.67]
Community characteristics				
Percent African American	-0.02	2.38	0.98	[0.96, 1.01]
Per capita income	-0.00001	1.44	1.00	[1.00, 1.00]
Number of unemployed persons—1st quartile (lowest)	0.18	0.37	1.2	[0.67, 2.16]
Number of unemployed persons—2nd quartile (medium-low)	-0.16	0.34	0.86	[0.5, 1.45]
Number of unemployed persons—3rd quartile (medium-high)	-0.81	8.41*	0.45	[0.26, 0.77]
Number of unemployed persons—4th quartile (highest)	Reference group			
Persons (%) below poverty level	-0.02	0.97	0.98	[0.94, 1.02]
Location—"not a statistical area"	-0.18	0.50	0.83	[0.5, 1.39]
Location—"Metropolitan statistical area"	-0.09	0.12	0.91	[0.55, 1.51]
Location—"Micropolitan statistical area"	Reference group			
Organizational characteristics				
For-profit ownership status	1.74	2.79	5.69	[0.74, 43.81]
Not-for-profit ownership status	1.81	2.85	6.09	[0.75, 49.6]
Government-owned ownership status	Reference group			
Total yearly discharges per HHA	-0.0001	1.29	1.00	[1.00, 1.00]
Number of years HHA Medicare-certified	0.01	2.54	1.01	[0.99, 1.03]
Percentage of discharges with only Medicare (HMO or FFS) health insurance	3.28	17.89*	26.72	[5.82, 122.45]
Percentage of discharges with only Medicaid (HMO or FFS) health insurance	Reference group			
Percentage of discharges with both Medicare (HMO or FFS) and Medicaid (HMO or FFS) health insurance	2.92	6.76*	18.58	[2.05, 168.32]
Operating profit margin	0.01	0.09	1.01	[0.96, 1.05]
Nurse staffing characteristics				
Number FTE Aides	0.003	0.97	1.00	[0.99, 1.01]
Number FTE LPNs	0.01	1.29	1.01	[0.99, 1.01]
Number FTE RNs	-0.0002	0.01	1.00	[0.99, 1.00]

Note: * = p <.05, <.01, <.001, <.0001; Odds ratio is probability of High AA HHA being high quality; HHI=Herfindahl-Hirschman Index; HHA=Home Healthcare Agency; HMO= health maintenance organization; FFS=fee-for-service; FTE=full-time equivalent; LPN=licensed practical nurse; RN=registered nurse

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